Post Closure Groundwater and Surface Water Monitoring Report, Spring 2021 Yankee Nuclear Power Station

Prepared for:

Yankee Atomic Electric Company
Yankee Nuclear Power Station
49 Yankee Road
Rowe, Massachusetts

Prepared by:

Wood Environment & Infrastructure Solutions, Inc.
511 Congress Street
Portland, Maine 04101

June 30, 2021

Project Number 3616206117

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Project Number 3617147318

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1.0 INTRODUCTION

Wood Environment & Infrastructure Solutions, Inc. (Wood) has been contracted by the Yankee Atomic Electric Company (YAEC), owner/operator of the former Yankee Nuclear Power Station (YNPS) to conduct the Post Closure Groundwater and Surface Water Monitoring Program at their site, located at 49 Yankee Road in Rowe, Massachusetts.

YNPS completed its decommissioning in 2007, under the oversight of the Nuclear Regulatory Commission (NRC). However, as part of the closure process, ongoing groundwater and surface water monitoring is still required under the Massachusetts Department of Environmental Protection (MassDEP). This work is to demonstrate that the groundwater is in compliance with the Massachusetts Contingency Plan (MCP) (MassDEP, 2020a) and for post closure monitoring of the Beneficial Use Determination (BUD) Area and the Southeast Construction Fill Area (SCFA). This report presents the findings from samples collected in May 2021 in support of the site closure requirements under the MCP.

2.0 BACKGROUND

Through the site closure process, a comprehensive investigation was conducted to characterize environmental conditions and to develop the conceptual site model, not only to identify source areas and impacted media, but to also describe the fate and transport of both chemicals and radionuclides in soils, groundwater, and surface water. These findings have been published in numerous reports and have achieved the appropriate regulatory approvals. The conceptual site model for groundwater at YNPS was published in the Final Groundwater Conditions Report, submitted to the NRC on February 15, 2007 (YNPS, 2007).

As part of the decommissioning project, 81 groundwater monitoring wells were installed to characterize the hydrogeology, and groundwater quality. Currently, there are 7 wells that remain on site. Of these wells, five groundwater monitoring wells were sampled in May 2021 to demonstrate compliance with the MCP and to support post closure monitoring. Results are presented and discussed below.

3.0 SCOPE OF WORK

Groundwater monitoring for closure under the License Termination Plan (LTP) has been completed. However, groundwater and surface water monitoring is still required to reach closure under the MassDEP and to support post closure monitoring. In keeping with this goal this program was completed in accordance with the MassDEP-approved Groundwater Monitoring Plan to Support Closure under the MCP (ERM, 2007) as modified by the MassDEP by letter dated February 23, 2016 (Appendix A), as well as the Phase II - Comprehensive Site Assessment Report (MassDEP, April 08, 2009).

On February 23, 2016 YNPS received a letter from the MassDEP approving the Minor Modification Permit application, entitled "Proposed 2015 Revisions to the Groundwater and Surface Water Monitoring Program", for the former YNPS in Rowe, MA. The application was prepared by Ransom Consulting, Inc. (Ransom) on behalf of YAEC, the owner of the YNPS. The application proposed to amend the June 19, 2007, MassDEP approval of the Final Post-Closure Groundwater Monitoring Plan (the Groundwater Monitoring Plan) for the YNPS, which addressed environmental monitoring at the Beneficial Use Determination (BUD) Fill Area (the former industrial area) and the Southeast Construction Fill Area (SCFA), in accordance with MassDEP's Solid Waste Regulations at 310 CMR 19.000.

The MassDEP approved the Minor Modification permit subject to a number of conditions and requirements. These conditions and requirements were identified in the MassDEP approval letter (Appendix A) and included a list of locations to be sampled, the frequency of sampling, and for which constituents they were to be analyzed. Additionally, this modification was to be initiated during the 2016 sampling event and continue every five years thereafter; this report describes the second five-year sampling event conducted in 2021. Accordingly, the May 2021 sampling event (the event was delayed with MassDEP concurrence from March 2021 to May 2021 due to COVID-19 concerns and snow and ice conditions at the Site) included the sampling of five monitoring wells, three surface water locations, and one surface water seep location. For the 2021 event, the State of Massachusetts stated it was not necessary to send split-samples from a subset of sample locations to the Massachusetts Department of Public Health Environmental Radiation Laboratory. The sampling program is summarized in Table 1. The sampling locations are shown on Figure 1. Groundwater samples were collected in accordance with Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (USEPA, 2017) and in

accordance with Wood's Site Specific Health and Safety Plan (Wood, 2021). Field data records are presented in Appendix B, and a summary of the field data parameters is presented in Table 2.

During the field effort, locks were replaced on the monitoring wells CFW-1, CFW-5, CFW-6, MW-105B, and MW-107C.

The radiochemistry data were validated in accordance with Site procedure ES-4, Rev. 1 (YNPS, 2021). Chemical analytical data were validated using guidance for Stage 2A data validation (USEPA, 2009) identified in the Region 1 EPA-New England Environmental Data Review Program Guidance (USEPA, 2018) and the USEPA National Functional Guidelines (USEPA, 2017a; USEPA, 2017b). As discussed in the validation report, the surface water samples were initially analyzed for metals using the incorrect fraction (total, dissolved) for some of the metals. This was identified during validation and, as a result, some of the samples were reanalyzed. A summary of the data validation findings and tabulated validated data are provided in Appendix C-1 (radiological), C-2 (chemical), and C-3 (validation checklists).

4.0 FINDINGS

Groundwater samples were submitted for both radiological and chemical parameters. The results and findings from the sampling events are presented in the following subsections.

4.1 RADIOLOGICAL PARAMETERS

Radionuclides in groundwater are compared to the United States Environmental Protection Agency's (USEPA's) Maximum Contaminant Level (MCL). In additional to these criteria, data are also evaluated over time to assess if trends are decreasing, stable, or increasing. Consistent with evaluations presented in previous Annual Post Closure Groundwater and Surface Water Monitoring Reports, a change of 15 percent over previous sampling events has been used to identify trends.

Groundwater samples were collected from two monitoring wells and one surface water seep location for analysis of radionuclides in May 2021. The tritium results are presented on Table 3 with previous data to demonstrate that there continues to be a generally downward and/or stable trend in tritium concentrations. Tritium was not detected in the surface water location sampled during this event.

Consistent with historical results, the highest concentration of tritium was detected at MW-107C at 2,630 picocuries per liter (pCi/L), with lower concentrations reported at monitoring well MW-105B (1,020 pCi/L). The MCL for tritium is 20,000 pCi/L. As shown on Table 3, these detections are consistent with the conceptual site model.

No other radionuclides were detected in any of the groundwater or surface water sample locations sampled during the May 2021 event.

Validated radiological data from the sampling event is provided in Appendix C-1.

4.2 CHEMICAL PARAMETERS

Groundwater chemical data are evaluated using the GW-1 groundwater standards (310 CMR 40.0974(2)) (MassDEP, 2020a). For the analyses where GW-1 standards are not published, data are compared to Massachusetts MCLs or Massachusetts Secondary MCLs (SMCLs) (MassDEP, 2020b). Surface water chemical data are evaluated using USEPA Ambient Water Quality Criteria (AWQC) (USEPA, 2021). For the analyses where AWQC are not published, data are compared to Massachusetts MCLs or SMCLs (MassDEP, 2020b).

Former Southeast Construction Fill Area. Samples were collected from three groundwater monitoring wells (CFW-1, CFW-5, and CFW-6) and three surface water locations (SW-1, SW-4 and SW-5) to assess the potential environmental impacts from the Former SCFA. A summary of the sampling program is presented in Table 1.

Several metals and other naturally occurring compounds were detected in both groundwater and surface water samples; however, the concentrations are consistent with background and historical data, with the exception of iron, which was elevated compared to historical data. Only iron and manganese were detected at concentrations that exceed the SMCLs. SMCLs are used to assess the aesthetic qualities of drinking water and are not health-based standards; concentrations that exceed SMCLs are not necessarily indicative of potential health risks.

The surface water samples were also analyzed for 1,4-dioxane. 1,4-dioxane was not detected in any of the surface water samples from the SCFA.

A summary of the groundwater data for wells downgradient of the SCFA is presented on Table 4. A summary of the surface water data for locations associated with the SCFA is presented in Table 5.

Sherman Spring. Sampling was completed at the Sherman Spring surface water location (SP-1) and samples were analyzed for VOCs, 1,4-dioxane, and total Resource Conservation and Recovery Act (RCRA) 8 metals. Barium was detected below applicable criteria. Other results were reported as not detected. A summary of the analytical data for Sherman Spring (including radiological parameters) is presented in Table 6.

5.0 CONCLUSIONS

The results from the May 2021 groundwater sampling event were consistent with the approved conceptual site model. Based on the data collected during the May 2021 sampling event, tritium concentrations continue to be stable or decreasing across the site, with the highest concentration reported at MW-107C at an activity of 2,630 pCi/L compared to the MCL of 20,000 pCi/L.

No additional sampling is warranted at this time. In accordance with the Post Closure Groundwater and Surface Water Monitoring Plan, the next groundwater sampling event is scheduled for the spring of 2026.

6.0 RECOMMENDATIONS

As the groundwater monitoring program is progressing, wells that are no longer part of the active network were recommended for closure in accordance with MassDEP Guidelines as described in previous reports (most recent report – Amec Foster Wheeler, 2016). Table 7 summarizes the status of each monitoring well at the Site as of May 2021. The monitoring wells remaining at the site include five wells that are sampled as part of the long-term monitoring program (CFW-1, CFW-5, CFW-6, MW-105B, and MW-107C) as well as two wells (MW-104A and MW-106A,), that are no longer sampled but, at the request of MassDEP, are kept active for potential future sampling events. In consultation with the MassDEP, YAEC maintenance responsibilities for the wells that will be left for possible future monitoring will be to protect from damage, and complete a visual inspection and lock replacement once every three years, which began in 2012 (MassDEP, 2011).

7.0 ACRONYMS

Wood	Wood Environment & Infrastructure Solutions, Inc.
AWQC	Ambient Water Quality Criteria
BUD	Beneficial Use Determination
LTP	License Termination Plan
MassDEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MCP	Massachusetts Contingency Plan
mg/L	milligrams per liter
NRC	Nuclear Regulatory Commission
pCi/L	picocuries per liter
Ransom	Ransom Consulting Inc.
RCRA	Resource Conservation and Recovery Act
SCFA	Southeast Construction Fill Area
SMCL	Secondary Maximum Concentration Limit
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
YAEC	Yankee Atomic Electric Company
YNPS	Yankee Nuclear Power Station

8.0 REFERENCES

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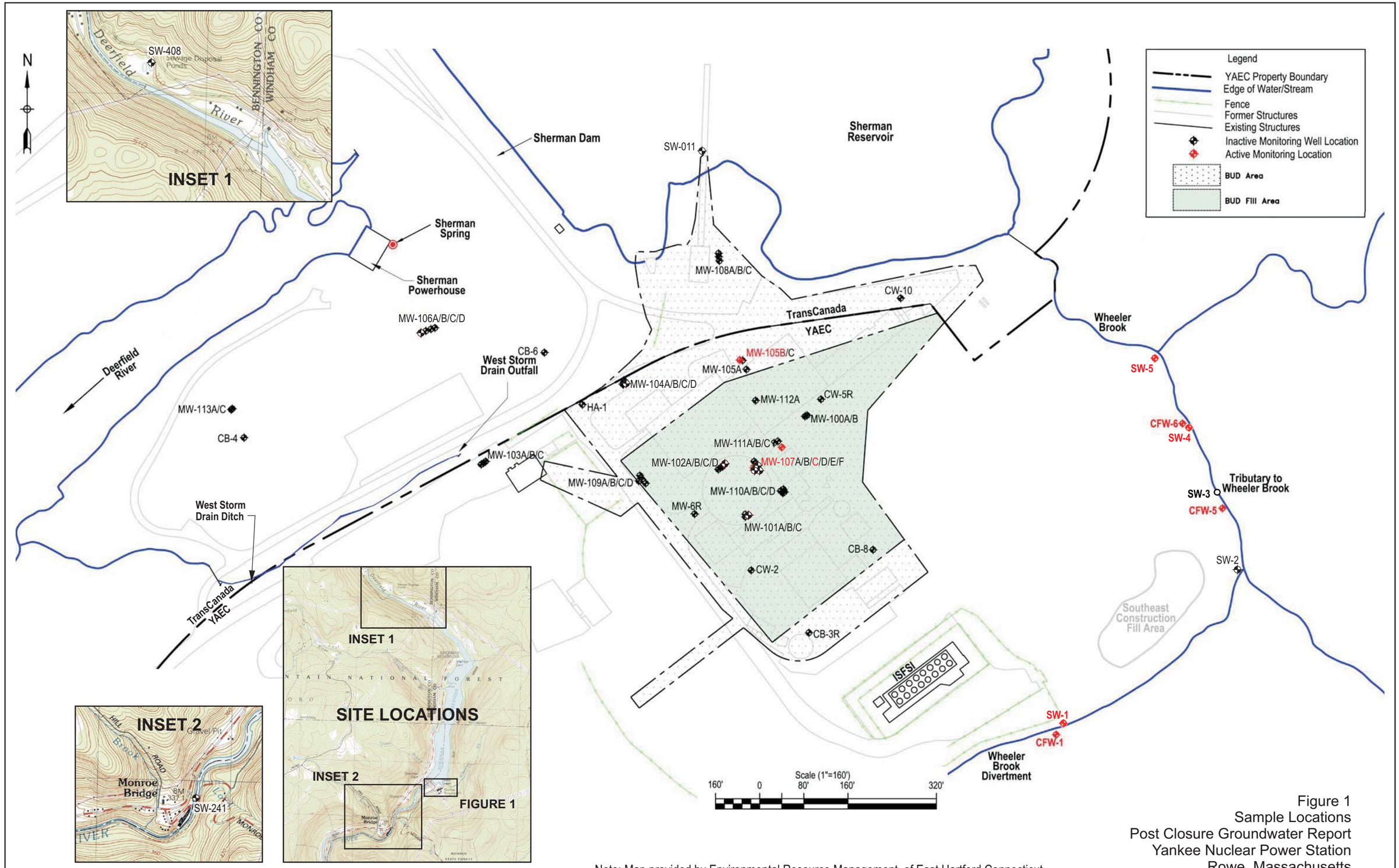
Figures



Note: Map provided by Environmental Resource Management, of East Hartford Connecticut.

Figure 1
Sample Locations
Post Closure Groundwater Report
Yankee Nuclear Power Station
Rowe, Massachusetts

amec foster wheeler

PORT2016023a.cdr

Tables

Table 1
Groundwater and Surface Water Monitoring Program Summary
May 2021

Yankee Nuclear Power Station
Rowe, Massachusetts

			Analysis Method	VOC - (8260 with TICs)[1]	1,4-Dioxane (8270 SIM)	Calcium, Iron, Manganese	RCRA 8 Metals - (6020A/7470)	Alkalinity - (SM2320B)	COD - (EPA 410.4)	Radionuclides - (Gamma Spec)[2, 3 (EPA 901.1)]	Strontium-90 - (GPC, LSC) Hard to Detect (EPA 901.1)	Tritium - (LSC)- Hard to Detect (EPA 906.0)	D.O., ORP, S.C., Temp., NTU (field parameters)
			Fraction	T	T	T	D (Field)	T	T	T	T	T	
			Bottle Size (Qty per Sample)	40 (3)	250 (2)	250 (1)	250 (1)	250 (1)	125 (1)[4]	2 (1)[4]	1 (1)[4]	250 (1)[4]	
			Bottle Size Units	mL	mL	mL	mL	mL	mL	Liter	Liter	mL	
			Bottle Material	Glass Vial	Amber glass	Poly	Poly	Poly	Poly	Poly	Poly	Amber Glass	
			Preservative	HCl	NaHSO4	HNO3	HNO3	4 Deg C	H2SO4	HNO3	HNO3	None	
			Lab ID	GEL	Eurofins	GEL	GEL	GEL	GEL	GEL	GEL	GEL	FIELD
Media	**Loc Name**	**Field Sample ID**	**QC Code**										
GW	CFW-1	CFW-1	FS			X		X	X				X
GW	CFW-5	CFW-5	FS			X		X	X				X
GW	CFW-5	CFW-5DUP	FD			X		X	X				
GW	CFW-5	CFW-5MS	MS			X		X	X				
GW	CFW-5	CFW-5MSD	MSD			X		X	X				
GW	CFW-6	CFW-6	FS			X		X	X				X
GW	MW-105B	MW-105B	FS									X	X
GW	MW-107C	MW-107C	FS									X	X
SW	Sherman Spring	SP-1	FS	X	X		X			X	X	X	X
SW	SW-1	SW-1	FS	X	X	X	X	X	X				X
SW	SW-4	SW-4	FS	X	X	X	X	X	X				X
SW	SW-5	SW-5	FS	X	X	X	X	X	X				X
QC	EB-006	EB-006	EB									X	
QC	TB-009	TB-009	TB	X									
QC	TB-010	TB-010	TB	X									
TOTAL				**6**	**4**	**9**	**4**	**9**	**9**	**1**	**1**	**4**	**9**

Prepared/Date: JAR 02/23/21
Checked/Date: CRS 02/23/21

Notes:
[1] = VOCs shall be performed as outlined in 310 CMR 19.132(h)(1-3), specifically methyl ethyl ketone, methyl isobutyl ketone, acetone, and 1,4-dioxane shall be included, and unknown peaks having intensities greater than 5 times the background intensity shall be identified (TICs)

[2] = Radiological analysis by Gamma Spectroscopy shall at a minimum quantify the radionuclides Ag-108m, Cs-134, Cs-137, Co-60, Eu-152, Eu-154, Eu-155, Nb-94, and Sb-125; also any other plant-related radionuclides detected by gamma spectroscopy above MDAs shall be reported as part of these analyses

As outlined in 310 CMR 19.132(i), detection limits for all parameters tested in groundwater samples shall be at or below the Massachusetts Drinking Water Standards & Guidelines (Maximum Contaminant Levels, or MCLs), including the 1,4-dioxane MCL of 0.3 micrograms/liter (ug/l)

[3] = Sample volume needed per sample is 2 L for Gamma Spectroscopy

[4] = Sample volume includes volume needed for QC samples, if applicable, for rad parameters and COD

4 Deg C	4 Degrees Celsius
COD	chemical oxygen demand
D	Dissolved
EB	Equipment Blank
FD	Field Duplicate
FS	Field Sample
GEL	General Engineering Laboratories
GPC	Gross Proportional Counter
GW	Groundwater Sample
H2SO4	Sulfuric Acid
HCl	Hydrochloric Acid
HNO3	Nitric Acid
LSC	Liquid Scintillation Counter
NaHSO4	Sodium Bisulfate
mL	milliliter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NaOH	Sodium Hydroxide
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
SW	Surface Water Sample
T	Total
TB	Trip Blank
TICs	Tentatively Identified Compounds
VOC	volatile organic compound
X	indicates parameter scheduled for analysis.

Table 2
Field Parameter Measurements

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

	Parameter	Conductivity	DO	Eh	pH	Temperature	Turbidity
	Units	µSiemens/cm	mg/L	mv	S.U.	Deg C	NTUs
Field Sample ID	Sample Date						
CFW-1	5/20/2021	0.025	2.8	132	4.3	10	--
CFW-5	5/19/2021	0.292	1.0	71	5.7	10	10.0
CFW-6	5/19/2021	0.08	4.9	142	4.9	10	1.9
MW-105B	5/19/2021	0.537	0.7	-188	7.4	14	1.2
MW-107C	5/19/2021	0.386	1.5	0	7.2	14	3.8
SW-1	5/20/2021	0.023	10.5	212	4.7	10	1.5
SW-4	5/20/2021	0.03	11.4	173	5.0	20	3.7
SW-5	5/20/2021	0.03	10.8	175	5.7	12	8.8

Prepared/Date: TDL 06/18/21
Checked/Date: ESS 06/21/21

Notes:
Deg C - Degrees Celsius
DO - dissolved oxygen
Eh - oxidation/reduction potential
µSiemens/cm - microseimens per centimeter
mg/L - milligrams per liter
mv - millivolts
NTUs - Nephlemetric Turbidity Units
S.U. - Standard Units
-- = well was purged dry prior to sampling; turbidity was not recorded on the sampled water; value was 401 NTU's at end of purging

Table 3
Summary of Tritium Analytical Data and Trend Analysis

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
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Location	Aug-03 pCi/L	Sep-03 pCi/L	Nov-03 pCi/L	Mar-04 pCi/L	May-04 pCi/L	Dec-06 pCi/L	Mar-07 pCi/L	Mar-08 pCi/L	Mar-09 pCi/L	Mar-10 pCi/L	Mar-12 pCi/L	Mar-14 pCi/L	Mar-16 pCi/L	May-21 pCi/L	Trend Analysis*
CFW-5	-		-		-	-	392	-	-						Not sampled this event
CFW-6	-		-		-	581	4000/4210	-	2440						Not sampled this event
MW-102D						6530	8580	1590	-	-					Not sampled this event
MW-104A						2850	3100/2930	1850	831/900	967/774	456 / -	- / -			Not sampled this event
MW-105B	4850		5220	4890	4530	2900	3440	4710	3490	3890	2500	1640	1460	1020	Decrease
MW-106A						3010	- /2850	846	484	530	-	-			Not sampled this event
MW-107C		48000	45780	8880**	39020	29100	30900	25700	21300	20100	11400	8910	6330	2630	Decrease
MW-107D		9150	9710	5940	10910	9310	9440	9380	8210	7280					Not sampled this event
MW-107E						5700	6420	5060 / 5160	4650	5470					Not sampled this event
MW-107F						9210	9220	9890	8150	8940					Not sampled this event
Monroe Dam									-	-	-	-			Not sampled this event
SP-1	-		-	210	890	1100	452	-	-	244	-	-	-	-	Not detected
SW-011									-	-	-				Not sampled this event
SW-408									-	-	-				Not sampled this event

Prepared/Date: CRS 06/18/21
Checked/Date: ESS 06/21/21

* Trend analysis is based on a concentration change of greater than 15% from previous four events.
** Result outside expected range and considered questionable. Subsequent results match conceptual site model.
967/774 - shows sample and duplicate sample
"-" signifies concentration less than minimum detectable activity
pCi/L - picocuries per liter
blank cells = not analyzed

Table 4
Summary of Chemical Data From SCFA Monitoring Wells

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1
		Sample Date	8/7/2003	8/18/2004	8/19/2005	8/25/2005	9/18/2006	9/19/2006	3/15/2007	3/16/2007	3/25/2008	3/11/2009	3/3/2010	3/8/2012	3/5/2014
		Sample ID	CFW-1-080703	CFW-1-081804	CFW-1-081905	CFW-1-082505	CFW-1-091806	CFW-1-091906	CFW-1-031507	CFW-1-031607	CFW-1	CFW-1	CFW-1	CFW-1	CFW-1
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Analysis	**Parameter**	**MCP Criteria**													
VOCs	4-Methyl-2-pentanone	0.35	-	-	0.0014 J		-		-		-	-	-	-	-
	Acetone	6.3	R	-	-		R		-		0.0027	-	-	-	-
	Chloromethane	NA	-	0.00069 J	0.0007 J		-		-						
	Methylene chloride	0.005	-	-	-		-		-		-	-	-	-	-
	Naphthalene	0.14	-		-		-		-		-	-	-	-	-
	Toluene	1	-	0.00043 J	-		-		-		-	-	-	-	-
Metals	Arsenic	0.01	-	-	-			-		-	-	-	-	-	-
	Barium	2	0.017	0.014	0.012			0.0451		0.0138	-	-	-	0.0248	0.0417
	Cadmium	0.005	-	-	-			-		0.0005 J	-	-	-	-	-
	Calcium	NA								1.83	1.5	1.7	1.3	1.9	2.51
	Chromium	0.1	-	-	-			0.0036 J		-	-	-	-	0.00263 J	0.00673 J
	Copper	1.3	-	-	-			0.0091		0.0026 J	-	-	-	0.00406	0.00752
	Iron	0.3*	***1.8***	***1.2*** J	***0.706*** J			***10.7***		***1.98***	***5.8*** J	***3.6*** J	***5.7***	***9.15***	***13.4***
	Lead	0.015	-	-	-			0.0056 J		0.0041 J	-	-	-	0.0012 J	0.002
	Manganese	0.05*	0.047	***0.11***	***0.0533***			***0.305***		***0.12***	***0.15***	***0.14***	***0.2***	***0.22***	***0.233***
	Mercury	0.002	-	-	-			-		-	-	-	-	-	-
	Selenium	0.05	-	-	-			-		-	-	-	-	-	-
	Silver	0.1	-	-	-			-		0.0013 J	-	-	-	-	0.00134
	Sodium	NA								1.28	0.94	-	0.81	0.958	0.935
	Zinc	5	-	-	-			-		0.0126	-	-	-	0.0142	0.0189
Cyanide	Cyanide, Total	0.2									-	-	-	-	-
Wet Chemistry	Total Alkalinity, as CaCO3	NA	6	5.1	7		5		7.14		3.4	3.4 J	4.6	5.64	4.07 J
	Chemical Oxygen Demand	NA	-	-	-		14.4			17.8	-	-	-	13.2 J	6.9 J
	Chloride	250*	-	-	-		-		0.67 J		-	-	-	0.6	0.594
	Nitrate as N	10	-	-		-		0.08 J		-	-	-	-	-	-
	Sulfate	250*	4.4 J	4.9	3.81 J		3.7		3.32		3.2	3.3	2.6	2.78	3.43
	Total Dissolved Solids	500*	-	4	22	13		29		12	46	1	-	15 J	8.57 J

Notes:

All results in milligrams per liter (mg/L)

Bold Italics indicates an exceedance of applicable criteria.

Applicable criteria is the MCP GW-1 standard (310 CMR 40.0974(2); effective 2/14/2008) and, if not available, the Maximum Contaminant Level or Secondary Maximum Contaminant Level (SMCL) (MADEP, 2020)

* indicates SMCL; not a health-based standard

FD - Field Duplicate

FS - Field Sample

J - estimated value

NA - Not Available

QC - Quality Control

R - data rejected during validation; unusable

VOCs - volatile organic compounds

"-" indicates analyte not detected

blank cells = not analyzed

Table 4
Summary of Chemical Data From SCFA Monitoring Wells

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location	CFW-1	CFW-1	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5
		Sample Date	3/24/2016	5/20/2021	8/5/2003	3/22/2004	6/8/2004	8/18/2004	8/17/2005	9/13/2006	3/8/2007	3/26/2008	3/26/2008	3/10/2009	3/10/2009	3/2/2010
		Sample ID	CFW-1	CFW-1	CFW-5-080503	CFW-5-032204	CFW-5-060804	CFW-5-081804	CFW-5-081705	CFW-5-091306	CFW-5-030807	CFW-5	CFW-5 DUP	CFW-5	CFW-5DUP	CFW-5
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FD	FS	FD	FS
Analysis	**Parameter**	**MCP Criteria**														
VOCs	4-Methyl-2-pentanone	0.35			-			-	0.0006 J	-	-	-	-	-	-	-
	Acetone	6.3			-			-	-	R	-	-	-	-	-	-
	Chloromethane	NA			-			0.00069 J	0.0009 J	-	-					
	Methylene chloride	0.005			-			-	-	-	-	-	-	-	-	-
	Naphthalene	0.14			-				-	-	-	-	-	-	-	-
	Toluene	1			-			-	-	-	-	-	-	-	-	-
Metals	Arsenic	0.01			-			-	-	-	0.0063	-	-	-	-	-
	Barium	2			0.043			0.061	0.0612	0.0638	0.0537	-	-	0.051	0.052	0.053
	Cadmium	0.005			-			-	-	-	-	-	-	-	-	-
	Calcium	NA	2.79	1.58		19.3	21.4				29.1	16	15	28	28	28
	Chromium	0.1			-			-	-	-	-	-	-	-	-	-
	Copper	1.3			-			-	-	-	-	-	-	-	-	-
	Iron	0.3*	***15.3***	***7.37***	***38***	***26.2***	***27.2***	***67***	***89.2***	***75.1***	***70.6***	***32*** J	***31*** J	***65*** J	***63*** J	***70***
	Lead	0.015			R			-	-	0.0036 J	-	-	-	-	-	-
	Manganese	0.05*	***0.346***	***0.203***	***3.5***	***2.42***	***2.58***	***4.4***	***4.16*** J	***4.62***	***4.28***	***1.9***	***1.8***	***3.7***	***3.7***	***3.8***
	Mercury	0.002			-			-	-	-	-	-	-	-	-	-
	Selenium	0.05			-			-	-	0.007 J	-	-	-	-	-	0.021 J
	Silver	0.1			-			-	-	-	-	-	-	0.017	0.018	-
	Sodium	NA									3.71	1.8	1.6	-	-	2.9
	Zinc	5			-			-	-	-	-	-	-	-	-	-
Cyanide	Cyanide, Total	0.2										-	-	0.012	0.012	-
Wet Chemistry	Total Alkalinity, as CaCO3	NA	5.22	5.74	87	92.8	87.6	93	101	130	127	69	63	130 J	170 J	110
	Chemical Oxygen Demand	NA	38	-	26	20.8	23.7	32	27.3	36.9	51.9	18	17	35	30	29
	Chloride	250*			-			2.7	1.91	15.5 J	9.12	2.3	2.2	4.8	4.2	5.1 J
	Nitrate as N	10			-			-	-	-	0.04 J	-	-	-	-	-
	Sulfate	250*			1.2			1.2	0.58 J	-	0.44 J	2.3	2.3	-	-	-
	Total Dissolved Solids	500*			120			200	111	170	170	110	100	110	150	130 J

Notes:

All results in milligrams per liter (mg/L)

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Applicable criteria is the MCP GW-1 standard (310 CMR 40.0974(2); effective 2/14/2008) and, if not available, the Maximum Contaminant Level or Secondary Maximum Contaminant Level (SMCL) (MADEP, 2020)

* indicates SMCL; not a health-based standard

FD - Field Duplicate

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J - estimated value

NA - Not Available

QC - Quality Control

R - data rejected during validation; unusable

VOCs - volatile organic compounds

"-" indicates analyte not detected

blank cells = not analyzed

Table 4
Summary of Chemical Data From SCFA Monitoring Wells

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-5	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6
		Sample Date	3/2/2010	3/6/2012	3/6/2012	3/4/2014	3/4/2014	3/24/2016	3/24/2016	5/19/2021	5/19/2021	8/11/2003	8/18/2004	8/24/2005	8/24/2005	4/19/2006	9/13/2006
		Sample ID	CFW-5 Dup	CFW-5	CFW-5DUP	CFW-5	CFW-5 DUP	CFW-5	CFW-5 DUP	CFW-5	CFW-5 DUP	CFW-6-081103	CFW-6-081804	FD001-082405	CFW-6-082405	CFW-6-042006	CFW-6-091306
		Qc Code	FD	FS	FD	FS	FD	FS	FD	FS	FD	FS	FS	FD	FS	FS	FS
Analysis	**Parameter**	**MCP Criteria**															
VOCs	4-Methyl-2-pentanone	0.35	-	-	-	-	-					-	-	0.0009 J	0.0008 J	-	-
	Acetone	6.3	-	-	-	-	-					-	-	-	0.008 J	0.0026 J	R
	Chloromethane	NA										-	-	-	-	-	-
	Methylene chloride	0.005	-	-	-	0.00159 J	0.00165 J					-	-	-	-	-	-
	Naphthalene	0.14	-	-	-	-	-					-		-	-	-	-
	Toluene	1	-	-	-	-	-					-	-	-	-	-	-
Metals	Arsenic	0.01	-	-	-	-	-					-	-	-	-	-	-
	Barium	2	0.053	0.0681	0.0685 J	0.0487	0.0489					0.069	0.077	0.0641	0.0629		0.0544
	Cadmium	0.005	-	-	-	-	-					-	-	-	-	-	-
	Calcium	NA	27	31.9	33 J	28.3	28.7	19.3	21.4	27.2	28.4						
	Chromium	0.1	-	-	-	-	-					-	-	-	-	-	0.0024 J
	Copper	1.3	-	-	-	-	-					-	-	-	-	-	-
	Iron	0.3*	***71***	***85.5***	***86.4*** J	***45.7***	***47.4***	***26.2***	***27.2***	***33.9***	***35.4***	***67***	***51*** J	***71.5***	***71***		***64.6***
	Lead	0.015	-	-	-	-	-					-	-	-	-	-	0.0031 J
	Manganese	0.05*	***3.7***	***5.32***	***5.36*** J	***3.61***	***3.76***	***2.42***	***2.58***	***2.66***	***2.72***	***8.8***	***6.9***	***7.65***	***7.54***		***6.69***
	Mercury	0.002	-	-	-	-	-					-	-	-	-	-	0.00018 J
	Selenium	0.05	0.022 J	-	-	-	-					-	-	-	-	-	0.0091 J
	Silver	0.1	-	-	-	-	-					-	-	-	-	-	-
	Sodium	NA	2.9	3.11	2.95 J	2.36	2.29										
	Zinc	5	-	-	-	-	-					-	-	-	-	-	0.0134
Cyanide	Cyanide, Total	0.2	-	-	-	-	-										
Wet Chemistry	Total Alkalinity, as CaCO3	NA	140	R	152	136 J	139 J	92.8	87.6	115	119	100	110	136	116		108
	Chemical Oxygen Demand	NA	26	59.7	52.7	34.4	34.4	20.8	23.7	41.6	45.8	38	33	30.1	31.8		35.1
	Chloride	250*	5 J	R	3.92	1.37	1.37					-	2.3	9.12	7.79		14.7 J
	Nitrate as N	10	-	R	-	-	-					-	-	-	-		0.04 J
	Sulfate	250*	-	R	0.557	0.226 J	0.249 J					-	-	-	-		-
	Total Dissolved Solids	500*	140 J	R	180	163	190					180	200	204	214		147

Notes:

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blank cells = not analyzed

Table 4
Summary of Chemical Data From SCFA Monitoring Wells

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6
		Sample Date	9/13/2006	3/8/2007	3/8/2007	3/25/2008	3/10/2009	3/2/2010	3/6/2012	3/6/2012	3/5/2014	3/24/2016	5/19/2021
		Sample ID	FD001-091306	CFW-6-030807	FD007-030807	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6	CFW-6
		Qc Code	FD	FS	FD	FS	FS	FS	FS	FS	FS	FS	FS
Analysis	**Parameter**	**MCP Criteria**											
VOCs	4-Methyl-2-pentanone	0.35	-	-	-	-	-	-	-	-	-		
	Acetone	6.3	R	-	-	-	-	-	-	-	-		
	Chloromethane	NA	-	-	-								
	Methylene chloride	0.005	-	-	-	-	0.00071 J	-	-	-	-		
	Naphthalene	0.14	-	-	-	-	-	-	-	-	-		
	Toluene	1	-	-	-	-	-	-	-	-	-		
Metals	Arsenic	0.01	-	0.0054 J	0.0049 J	-	-	-	-	-	-		
	Barium	2	0.0592	0.0612	0.0592	-	-	-	0.0602	0.0647	0.0647		
	Cadmium	0.005	-	0.0005 J	0.0002 J	-	-	-	-	0.000135 J	0.000135 J		
	Calcium	NA		25.5	25.4	7.4	14	14	16.7	15.9	15.9	9.34	10.2
	Chromium	0.1	0.0027 J	0.0022 J	0.0028 J	-	-	-	-	-	-		
	Copper	1.3	-	-	-	-	-	-	-	-	-		
	Iron	0.3*	***68.1***	***56.8***	***58.8***	***0.57*** J	***39*** J	***20***	***67.1***	***35.5***	***35.5***	***4.64***	***3.41***
	Lead	0.015	0.003 J	0.0029 J	-	-	-	-	-	-	-		
	Manganese	0.05*	***7.2***	***6.74***	***6.8***	***0.2***	***3.6***	***2.9***	***4.93***	***3.74***	***3.74***	***1.33***	***1.74***
	Mercury	0.002	-	0.00006 J	-	-	-	-	-	-	-		
	Selenium	0.05	0.0101 J	-	-	-	-	-	-	-	-		
	Silver	0.1	-	-	-	-	0.013	-	-	-	-		
	Sodium	NA		1.56	1.52	1.3	-	2.7	5.05	4	4		
	Zinc	5	-	-	0.0056	-	-	-	-	0.00581 J	0.00581 J		
Cyanide	Cyanide, Total	0.2				-	-	-	0.00412 J	-	-		
Wet Chemistry	Total Alkalinity, as CaCO3	NA	131	100	128	17	100 J	71	126	108 J	108 J	26.1	31.1
	Chemical Oxygen Demand	NA	36.4	26.3	51.9	27	23	12	59.7	39.4	39.4	40.8	29.1
	Chloride	250*	16.1 J	12.5	11.8	-	3.2	2.7 J	1.53	0.911	0.911		
	Nitrate as N	10	-	0.04 J	0.04 J	-	-	-	-	-	-		
	Sulfate	250*	-	0.7 J	0.68 J	4.7	5.8	4.3 J	0.755	1.49	1.49		
	Total Dissolved Solids	500*	172	189	181	33	77	89 J	187	130	130		

Notes:

All results in milligrams per liter (mg/L)

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"-" indicates analyte not detected

blank cells = not analyzed

Table 5
Summary of Chemical Data for SCFA Surface Water Locations

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-2
		Sample Date	3/25/2008	3/10/2009	3/3/2010	3/8/2012	3/5/2014	3/24/2016	5/21/2021	3/25/2008
		Sample ID	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-2
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS
Analysis	**Param Name**	**Screening Values**								
VOCs	Methylene chloride	0.02	-	-	-	-	-	-	-	-
	1,4-Dioxane	0.0003***						-	-	
Metals	Barium	1	-	-	-	0.0123	0.00967	0.00796	0.00956	-
	Calcium	NA	2.5	2.2	2.6	2.39	2.84	1.96	2.21	2.3
	Chromium	0.1	-	-	-	-	0.00215 J	-	-	-
	Iron	0.3**	0.016 J	0.064 J	0.032	0.133	-	-	0.104	0.021 J
	Lead	0.015*						-	-	
	Manganese	0.05**	-	-	-	0.0144	0.0202	0.00312 J	0.0132	-
	Sodium	NA	1.1	-	0.78	0.878	1.1			1.1
	Zinc	7.4	-	-	-	0.00451 J	-			-
Cyanide	Cyanide, Total	0.004	-	-	-	-	-			-
Wet Chemistry	Total Alkalinity, as CaCO3	NA	1.9	2.3	5.4	2.57	4.07 J	3.13	6.53	1.1
	Chemical Oxygen Demand	NA	-	-	-	-	-	18 J	17.2	-
	Chloride	250**	-	-	-	0.591	0.47			-
	Nitrate as N	10	-	-	-	0.25	0.14			-
	Sulfate	250**	5	4.2	5.5	4.97	5.91			5
	Total Dissolved Solids	500**	21	5	19 J	20	4.29 J			54

Notes:
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Screening value is the USEPA Ambient Water Quality Criteria (AWQC) and, if not available, the Maximum Contaminant Level or Secondary Maximum Contaminant Level (MADEP, 2020)
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FS - Field Sample
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NA - Not Available
QC - Quality Control
VOCs - volatile organic compounds
"-" indicates analyte not detected
Blank cell= not analyzed

Table 5
Summary of Chemical Data for SCFA Surface Water Locations

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location	SW-2	SW-2	SW-2	SW-2	SW-2	SW-3	SW-3	SW-3	SW-3
		Sample Date	3/10/2009	3/3/2010	3/8/2012	3/4/2014	3/4/2014	3/25/2008	3/10/2009	3/3/2010	3/8/2012
		Sample ID	SW-2	SW-2	SW-2	SW-2	SW-2	SW-3	SW-3	SW-3	SW-3
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS
Analysis	**Param Name**	**Screening Values**									
VOCs	Methylene chloride	0.02	-	-	-	0.00151 J	0.00151 J	-	-	-	-
	1,4-Dioxane	0.0003***									
Metals	Barium	1	-	-	0.0107	0.0108	0.0108	-	-	-	0.0106
	Calcium	NA	2.1	2.5	1.89	2.25	2.25	2.2	2	2.4	1.95
	Chromium	0.1	-	-	-	-	-	-	-	-	-
	Iron	0.3**	0.063 J	0.037	0.0483 J	-	-	0.029 J	0.061 J	***0.5***	***0.362***
	Lead	0.015*									
	Manganese	0.05**	-	-	0.00437 J	0.00835	0.00835	-	-	***0.074***	0.0242
	Sodium	NA	-	0.8	0.675	0.857	0.857	1.1	-	0.6	0.654
	Zinc	7.4	-	-	0.00491 J	0.00356 J	0.00356 J	-	-	-	0.00362 J
Cyanide	Cyanide, Total	0.004	-	-	-	-	-	-	-	-	-
Wet Chemistry	Total Alkalinity, as CaCO3	NA	2.1	5.4	2.05	-	-	-	1.7	5.6	3.08
	Chemical Oxygen Demand	NA	-	-	-	11.9 J	11.9 J	-	-	-	-
	Chloride	250**	-	-	0.556	0.571	0.571	-	-	-	0.553
	Nitrate as N	10	-	-	0.227	0.0937 J	0.0937 J	-	-	-	0.228
	Sulfate	250**	5.4	5.5	4.26	5.22	5.22	5.9	5.3	4.8	4.28
	Total Dissolved Solids	500**	16	19 J	15.7	5.71 J	5.71 J	8	26	13 J	8.57 J

Notes:
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Table 5
Summary of Chemical Data for SCFA Surface Water Locations

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location	SW-3	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-5
		Sample Date	3/4/2014	3/25/2008	3/10/2009	3/2/2010	3/6/2012	3/4/2014	3/24/2016	5/20/2021	3/25/2008
		Sample ID	SW-3	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-5
		Qc Code	FS	FS	FS	FS	FS	FS	FS	FS	FS
Analysis	**Param Name**	**Screening Values**									
VOCs	Methylene chloride	0.02	0.00173 J	-	-	-	-	-	-	-	-
	1,4-Dioxane	0.0003***							-	-	
Metals	Barium	1	0.0103	-	-	-	0.0142	0.0118	0.0107	0.0132	-
	Calcium	NA	2.54	2.6	2.2	2.4	3.12	3.04	2.05	2.94	2.3
	Chromium	0.1	-	-	-	-	-	-	-	-	-
	Iron	0.3**	***0.514***	***1.1*** J	***0.55*** J	***0.9***	***2.08***	***1.81***	***0.774***	***12.5***	0.26 J
	Lead	0.015*							-	-	
	Manganese	0.05**	***0.0661***	***0.14***	***0.076***	***0.13***	***0.24***	***0.212***	***0.107***	***0.25***	0.04
	Sodium	NA	0.893	1.1	-	0.65	0.96	0.967			1
	Zinc	7.4	-	-	-	-	0.00456 J	-			-
Cyanide	Cyanide, Total	0.004	-	-	-	-	-	-			-
Wet Chemistry	Total Alkalinity, as CaCO3	NA	5.6 J	3.5	2.9	6.5	6.67	8.14 J	3.65	8.51	1.5
	Chemical Oxygen Demand	NA	19.4 J	-	-	-	13.2 J	-	-	12.2	-
	Chloride	250**	0.673	-	-	-	0.711	0.61			-
	Nitrate as N	10	0.0986 J	-	-	-	0.205	0.0932 J			-
	Sulfate	250**	5.13	5.1	5.2	4.8 J	4.79	5.05			5
	Total Dissolved Solids	500**	4.29 J	19	35	11 J	28.6	15.7			31

Notes:
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VOCs - volatile organic compounds
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Table 5
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Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location	SW-5	SW-5	SW-5	SW-5	SW-5	SW-5
		Sample Date	3/10/2009	3/2/2010	3/6/2012	3/4/2014	3/24/2016	5/20/2021
		Sample ID	SW-5	SW-5	SW-5	SW-5	SW-5	SW-5
		Qc Code	FS	FS	FS	FS	FS	FS
Analysis	**Param Name**	**Screening Values**						
VOCs	Methylene chloride	0.02	-	-	-	-	-	-
	1,4-Dioxane	0.0003***					-	-
Metals	Barium	1	-	-	0.0126	0.0105	0.00999	0.0126
	Calcium	NA	2.2	2	2.77	2.33	1.8	3.56
	Chromium	0.1	-	-	-	-	-	-
	Iron	0.3**	***0.48*** J	0.27	***1.52***	***0.496***	0.265	***30.7***
	Lead	0.015*					-	-
	Manganese	0.05**	***0.071***	0.044	***0.141***	***0.0657***	0.04	***0.338***
	Sodium	NA	-	0.6	0.883	0.859		
	Zinc	7.4	-	-	-	-		
Cyanide	Cyanide, Total	0.004	-	-	-	-		
Wet Chemistry	Total Alkalinity, as CaCO3	NA	2.7	4.3	13.9	3.56 J	2.09	9.31
	Chemical Oxygen Demand	NA	-	-	13.2 J	31.9	29.4	12.2
	Chloride	250**	-	-	0.662	0.526		
	Nitrate as N	10	-	-	0.195	0.087 J		
	Sulfate	250**	5.3	4.2 J	4.67	4.72		
	Total Dissolved Solids	500**	3	4 J	20	37.1		

Notes:
All results in milligrams per liter (mg/L)
Screening value is the USEPA Ambient Water Quality Criteria
(AWQC) and, if not available, the Maximum Contaminant
Level or Secondary Maximum Contaminant Level (MADEP, 2020)
* indicates criteria is Maximum Contaminant Level
** indicates criteria is from the Secondary Maximum
Contaminant Level; not a health-based standard
*** indicates Mass Guideline Value
FS - Field Sample
J - estimated value
NA - Not Available
QC - Quality Control
VOCs - volatile organic compounds
"-" indicates analyte not detected
Blank cell= not analyzed

Table 6
Summary of Analytical Data for Sherman Spring Location

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location ID	SP-1		SP-1		SP-1		SP-1		SP-1	
		Sample ID	SP-1-050404-RN		SP-1-(006)-120406		SP-1-NF-(007)		SP-1		SP-1	
		Sample Date	5/4/2004		12/4/2006		3/6/2007		3/26/2008		3/11/2009	
		QC Code	FS		FS		FS		FS		FS	
Analysis	**Units**	**Screening Value**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
VOCs	ug/L	NA							-		-	
Metals												
Barium	mg/L	1							-		-	
Lead	mg/L	0.015*							-		-	
Silver	mg/L	0.1**							-		-	
Radionuclides (Gamma Spec)												
Cesium-137	pCi/L	200	-				-		-		-	
Cobalt-60	pCi/L	100	2.9				-		-		-	
Strontium-90	pCi/L	8	-				-		-		-	
Tritium	pCi/L	20,000	890		1100	3,D	452		-		-	
1,4-Dioxane	ug/L	0.3****							-		-	

Notes:
Only historically detected compounds shown (with exception of VOCs)
Units: mg/L = milligrams per liter; pCi/L = picocuries per liter
ug/L = micrograms per liter
Screening value is the USEPA Ambient Water Quality Criteria (AWQC) and, if not available, the Maximum Contaminant Level or Secondary Maximum Contaminant Level (MADEP, 2020)
* indicates criteria is Maximum Contaminant Level
** indicates criteria is from the Secondary Maximum Contaminant Level; not a health-based standard
*** indicates Mass Guideline Value
FS - Field Sample
J - estimated value
NA - Not Available
QC - Quality Control
VOCs - volatile organic compounds
"-" indicates analyte not detected
Blank cell= not analyzed

Table 6
Summary of Analytical Data for Sherman Spring Location

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

		Location ID	SP-1		SP-1		SP-1		SP-1		SP-1		SP-1	
		Sample ID	SP-1		SP-1		SP-1		SP-1		SP-1		SP-1	
		Sample Date	3/3/2010		3/8/2012		4/24/2012		3/4/2014		3/23/2016		5/20/2021	
		QC Code	FS		FS		FS		FS		FS		FS	
Analysis	**Units**	**Screening Value**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
VOCs	ug/L	NA			-				-		-		-	
Metals														
Barium	mg/L	1	0.026		0.028				0.023		0.0221		0.0222	
Lead	mg/L	0.015*	-		0.000881	J			-		-		-	
Silver	mg/L	0.1**	-		-				0.000627	J	-		-	
Radionuclides (Gamma Spec)														
Cesium-137	pCi/L	200	-		6.11		-		-		-		-	
Cobalt-60	pCi/L	100	-		-				-		-		-	
Strontium-90	pCi/L	8	-		-				-		-		-	
Tritium	pCi/L	20,000	244		-				-		-		-	
1,4-Dioxane	ug/L	0.3****	-		-				-		0.087	J	-	

Notes:
Only historically detected compounds shown (with exception of VOCs)
Units: mg/L = milligrams per liter; pCi/L = picocuries per liter
ug/L = micrograms per liter
Screening value is the USEPA Ambient Water Quality Criteria (AWQC) and, if not available, the Maximum Contaminant Level or Secondary Maximum Contaminant Level (MADEP, 2020)
* indicates criteria is Maximum Contaminant Level
** indicates criteria is from the Secondary Maximum Contaminant Level; not a health-based standard
*** indicates Mass Guideline Value
FS - Field Sample
J - estimated value
NA - Not Available
QC - Quality Control
VOCs - volatile organic compounds
"-" indicates analyte not detected
Blank cell= not analyzed

Table 7
Monitoring Well Status Update May 2021

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

Well ID	Well Diameter	Well Depth (feet)	Protection	Is Well Located in BUD?	Is Well Located in BUDFA?	Surrounding Area	Well Status as of May 2021
CB-3R	2 inch	21	Standpipe	Yes	No	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
CB-4	2.25 inch	20	Road box	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010
CB-6	2 inch	27	Standpipe	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010
CB-8	2.5 inch	24.5	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
CW-5R	2 inch	23	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
CW-10	2 inch	31.5	Standpipe	Yes	No	Topsoil, grass seed	Decommissioning activities completed in 2010
CFW-1	2 inch	8	Standpipe	No	No	Topsoil, grass seed	Part of long-term monitoring program
CFW-5	2 inch	5	Standpipe	No	No	Topsoil, grass seed	Part of long-term monitoring program
CFW-6	2 inch	6	Standpipe	No	No	Topsoil, grass seed	Part of long-term monitoring program
HA-1	Unknown	18	Standpipe	Yes	No	Topsoil, grass seed	Proposed for grouting 2012 but well could not be located. It is believed that it was a temporary well and was previously removed.
MW-6R	2 inch	22	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-100A	2 inch	20	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-100B	2 inch	43	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-101A	2 inch	25	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-101B	2.25 inch	156	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-101C	2 inch	99	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-102A	2 inch	39	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2016
MW-102B	2 inch	131.5	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2016
MW-102C	2 inch	99	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2016
MW-102D	2 inch	21	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-103A	2 inch	26	Standpipe	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-103B	2.25 inch	295	Standpipe	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-103C	2 inch	125	Standpipe	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-104A	2 inch	20	Standpipe	Yes	No	Topsoil, grass seed	Leave for possible future sampling
MW-104B	2.25 inch	194.5	Standpipe	Yes	No	Topsoil, grass seed	Monitoring well grouted to the surface in 2010
MW-104C	2.25 inch	99	Standpipe	Yes	No	Topsoil, grass seed	Monitoring well grouted to the surface in 2010
MW-104D	2 inch	45	Standpipe	Yes	No	Topsoil, grass seed	Monitoring well grouted to the surface in 2010
MW-105A	2 inch	20	Standpipe	Yes	No	Topsoil, grass seed	Monitoring well grouted to the surface in 2016
MW-105B	2 inch	75	Standpipe	Yes	No	Topsoil, grass seed	Part of long-term monitoring program
MW-105C	2 inch	45	Standpipe	Yes	No	Topsoil, grass seed	Monitoring well grouted to the surface in 2016
MW-106A	2 inch	22	Road box	No	No	Topsoil, grass seed	Leave for possible future sampling
MW-106B	2.25 inch	265	Road box	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-106C	2 inch	95	Road box	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-106D	2.25 inch	155	Road box	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-107A	2 inch	25	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-107B	2.25 inch	110	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2016
MW-107C	2 inch	32	Standpipe	Yes	Yes	Topsoil, grass seed	Part of long-term monitoring program

Table 7
Monitoring Well Status Update May 2021

Post Closure Groundwater and Surface Water Monitoring Report Spring 2021
Yankee Nuclear Power Station
Rowe, Massachusetts

Well ID	Well Diameter	Well Depth (feet)	Protection	Is Well Located in BUD?	Is Well Located in BUDFA?	Surrounding Area	Well Status as of May 2021
MW-107D	2 inch	81.2	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2016
MW-107E	2 inch	60	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2016
MW-107F	2 inch	57	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-108A	2 inch	25	Standpipe	Yes	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-108B	2.25 inch	215	Standpipe	Yes	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-108C	2 inch	170	Standpipe	Yes	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-109A	2 inch	20	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2010
MW-109B	2.25 inch	190	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2010
MW-109C	2 inch	55	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2010
MW-109D	2 inch	113	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2010
MW-110A	2 inch	30	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-110B	2 inch	110	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-110C	2 inch	51	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-110D	2 inch	88	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-111A	2 inch	23	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-111B	2 inch	80	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-111C	2 inch	37	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-112A	2 inch	26	Standpipe	Yes	Yes	Topsoil, grass seed	Monitoring well grouted to the surface in 2012
MW-113A	2 inch	25	Road box	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010
MW-113C	2 inch	90	Road box	No	No	Topsoil, grass seed	Decommissioning activities completed in 2010

Notes:
BUD = Beneficial Use Determination
BUDFA = Beneficial Use Determination Fill Area

Created by MV 7/10/12
Updated and Checked by CRS 06/28/21

APPENDIX A

MassDEP LETTER TO YNPS DATED FEBRUARY 23, 2016, "ROWE – DSWM-16-253-009 MassDEP – APPROVAL MINOR MODIFICATION PERMIT POST-CLOSURE ENVIRONMENTAL MONITORING 310 CMR 19.000"

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

FEB 23 2016

Yankee Atomic Electric Company
49 Yankee Rd
Rowe, MA 01367
Attention: Brian Smith, ISFSI Manager

RE: Rowe-DSWM-16-253-009
MassDEP - **Approval**
Minor Modification Permit
Post-Closure Environmental Monitoring
310 CMR 19.000
Yankee Nuclear Power Station
49 Yankee Road

Dear Mr. Smith:

On January 13, 2016, the Massachusetts Department of Environmental Protection (MassDEP) received the Minor Modification Permit application (the application), entitled "Proposed 2015 Revisions to the Groundwater and Surface Water Monitoring Program", for the former Yankee Nuclear Power Station (YNPS) in Rowe, MA. The application was prepared by Ransom Consulting, Inc. (Ransom) on behalf of Yankee Atomic Electric Company (Yankee), the owner of the YNPS. The application proposes to amend the June 19, 2007 MassDEP approval of the Final Post-Closure Groundwater Monitoring Plan (the Groundwater Monitoring Plan) for the YNPS, which addressed environmental monitoring at the Beneficial Use Determination (BUD) Fill Area (the former industrial area) and the Southeast Construction Fill Area (SCFA), in accordance with MassDEP's Solid Waste Regulations at 310 CMR 19.000.

In accordance with 310 CMR 19.142, the June 19, 2007 Groundwater Monitoring Plan approval required ongoing groundwater monitoring during the 30-year post-closure maintenance and monitoring period (which ends on June 19, 2037) at groundwater monitoring wells MW-104A, MW-105B, MW-106A, MW-107C, and Sherman Spring (SP-1) in the BUD Fill Area, and also at monitoring wells CFW-1, CFW-5, and CFW-6 in the SCFA. On December 6, 2011, MassDEP issued correspondence to Yankee, which approved the decommissioning of numerous additional groundwater monitoring wells at the YNPS, but which required Yankee to retain, maintain and preserve monitoring wells MW-102A, MW-102B, MW-102C, MW-105A, MW-105C, MW-107B, MW-107D, and MW-107E throughout the 30-year post-closure maintenance and monitoring period.

Proposed Modifications

The application proposes the following modifications to the June 19, 2007 Groundwater Monitoring Plan

approval:

1. Discontinue all groundwater monitoring in the BUD Fill Area, except continue monitoring for tritium only, in monitoring well MW-107C and Sherman Spring, every five years.
2. Abandon and properly decommission all remaining groundwater monitoring wells in the BUD Fill Area, i.e. MW-102A, MW-102B, MW-102C, MW-105A, MW-105C, MW-107B, MW-107D, and MW-107E. Decommissioning will include grouting the full depth of each well, in accordance with MassDEP's "Standard References for Monitoring Wells, Policy #WSC-310-91, dated April, 1991" (Standard References).
3. Discontinue surface water sampling at the Deerfield River (upstream/SW-408, and downstream/Monroe Dam), Sherman Reservoir (SW-011), and locations SW-2 and SW-3 on Wheeler Brook.
4. Continue monitoring at the SCFA of groundwater monitoring wells CFW-1, CFW-5, & CFW-6 and surface water locations SW-1, SW-4, & SW-5 in Wheeler Brook every five years, but reduce monitoring parameters to: dissolved oxygen, oxidation/reduction potential, specific conductance, temperature and turbidity (as field parameters); and alkalinity, calcium, iron, manganese, and chemical oxygen demand (as laboratory parameters).

Ransom states that the proposed reductions in environmental monitoring are justified based on monitoring results to date. Ransom states that the next monitoring event is scheduled for 2019, however MassDEP notes that the actual scheduled monitoring events, according to the Groundwater Monitoring Plan, are 2016, 2021, 2026, 2031, and 2036.

MassDEP Determinations

MassDEP has reviewed the Minor Modification permit application in accordance with MGL c. 111 s. 150A, MGL c. 30A, the Massachusetts Solid Waste Regulations 310 CMR 19.000, the MassDEP's publication Landfill Technical Guidance Manual (the LAC), revised in May, 1997, and the MassDEP's publication Standard References for Monitoring Wells (WSC-310-91). MassDEP approves the Minor Modification permit application in accordance with the regulations at 310 CMR 19.000, subject to the following conditions and requirements.

1. Yankee shall perform environmental monitoring at the YNPS site in accordance with this Modification Permit approval during 2016, 2021, 2026, 2031, and 2036. MassDEP may, in writing, extend or shorten the 30-year post-closure monitoring period, or modify the post-closure monitoring requirements, if deemed appropriate based on protection of public health, safety, and the environment.

2. Except as modified by the conditions of this approval, Yankee shall also comply with the requirements of: MassDEP's Corrective Action Design (CAD) and Closure Certification permit approvals for the SCFA; MassDEP's June 19, 2007 Revised Beneficial Use Determination (BUD) for Structures permit approval; and the MassDEP's review of the Final BWSC Phase II Assessment for the YNPS site, including the Final Risk Assessment.

3. All environmental monitoring shall be performed by a qualified, independent consultant experienced in the solid waste field, in accordance with 310 CMR 19.132 and MassDEP's publication Standard References for Monitoring Wells (WSC-310-91).

4. Groundwater monitoring wells shall be sampled in accordance with the procedures outlined in the MassDEP's publication Standard References for Monitoring Wells (WSC-310-91). Sampling can alternatively be performed in accordance with the USEPA publication Low

Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, dated July 30, 1996.

5. Quality Assurance/Quality Control Plan (QA/QC) protocols for all environmental monitoring should generally follow those outlined in the MassDEP's LAC Manual and Standard References manuals.

6. Groundwater monitoring wells MW-105B, MW-107C, CFW-1, CFW-5, & CFW-6, and surface water locations SW-1, SW-4, SW-5 and Sherman Spring shall be sampled during 2016, 2021, 2026, 2031, and 2036. Monitoring wells MW-105B, MW-107C, CFW-1, CFW-5, & CFW-6 shall be protected from damage, and shall be visually inspected and equipped with a new lock during each monitoring event.

7. Groundwater samples from monitoring wells MW-105B and MW-107C shall be analyzed for tritium, as a Hard-to-Detect (HTD) radionuclide.

8. Groundwater samples from monitoring wells CFW-1, CFW-5, and CFW-6 shall be analyzed for dissolved oxygen, oxidation/reduction potential, specific conductance, temperature and turbidity (as field parameters); and alkalinity, calcium, iron, manganese, and chemical oxygen demand (as laboratory parameters).

9. Surface water samples from Sherman Spring shall be analyzed for Dissolved RCRA 8 metals, volatile organic compounds (VOCs) by EPA Method 8260, radionuclides by gamma spectroscopy, and also for the HTD radionuclides tritium and Sr-90. Radiological analyses by gamma spectroscopy shall at a minimum quantify the radionuclides Ag-108m, Cs-134, Cs-137, Co-60, Eu-152, Eu-154, Eu-155, Nb-94, and Sb-125. In addition, any other plant-related radionuclides detected by gamma spectroscopy above MDAs shall be reported as part of these analyses.

10. Surface water samples from surface water locations SW-1, SW-4, and SW-5 shall be analyzed for: dissolved oxygen, oxidation/reduction potential, specific conductance, temperature and turbidity (as field parameters); and Dissolved RCRA 8 metals, VOCs by EPA Method 8260, alkalinity, calcium, iron, manganese, and chemical oxygen demand (as laboratory parameters).

11. All VOC analyses by EPA Method 8260 shall be performed as outlined in 310 CMR 19.132(h)(1-3), specifically methyl ethyl ketone, methyl isobutyl ketone, acetone, and 1,4-dioxane shall be included, and unknown peaks having intensities greater than 5 times the background intensity shall be identified (Tentatively Identified Compounds, or TICs). As outlined at 310 CMR 19.132(i), detection limits for all parameters tested in groundwater samples shall be at or below the Massachusetts Drinking Water Standards & Guidelines (Maximum Contaminant Levels, or MCLs), including the 1,4-dioxane MCL of 0.3 micrograms/liter (ug/l).

12. Yankee shall submit the results of all groundwater monitoring data to MassDEP within 45 days of the date of sampling.

13. Yankee shall ensure that certified, third-party operations & maintenance (O&M) inspections of the BUD Fill Area and SCFA are completed once every two years, in accordance with 310 CMR 19.018, and that third-party inspection reports are submitted to MassDEP within 30 days of the date of the inspection.

14. MassDEP reserves the right to modify this approval at any time, based on its review of the results of monitoring data, or should MassDEP otherwise determine that additional environmental monitoring is required to protect public health, safety or the environment.

15. MassDEP and its agents and employees shall have the right to enter upon the YNPS site at reasonable times and with reasonable notice, to inspect the groundwater monitoring network, and to otherwise monitor compliance with this Approval and other MassDEP environmental laws and regulations.

Pursuant to 310 CMR 19.033(5), any person aggrieved by the issuance of this approval, except as provided for under 310 CMR 19.033(4)(b), may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L. c. 111, s. 150A and C. 30A not later than thirty [30] days following the date of issuance of this decision. The standing of a person to file an appeal and the procedures for filing such appeal shall be governed by the provisions of M.G.L. c. 30 A. Unless the person requesting an appeal requests and is granted a stay of the terms and conditions of the permit by a court of competent jurisdiction, the final permit decision shall be effective in accordance with 310 CMR 19.033(3).

Any aggrieved person intending to appeal the decision to the superior court shall first provide notice to the MassDEP of said intention to commence such action. Said Notice of Intention shall include the MassDEP File Number (16-253-009) and shall identify with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such notice shall be provided to the Office of General Counsel of the MassDEP and the Regional Director for the regional office which made the decision, at least five days prior to the filing of an appeal. The appropriate addresses to which to send such notices are:

General Counsel
MassDEP of Environmental Protection
One Winter Street-Third floor
Boston, MA 02108

&

Regional Director
MassDEP of Environmental Protection
436 Dwight Street - 5th Floor
Springfield, MA 01103

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in 310 CMR 19.000, provided that a matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

The MassDEP reserves the right to require additional investigatory or remedial work at the YNPS site, including alternative remedial measures, if continued monitoring results indicate such a need. This approval pertains only to the solid waste management aspects of the proposal and does not negate the responsibilities of the owners or operators to comply with any other local, state or federal laws and regulations now or in the future.

If you have any questions concerning this matter, please contact the undersigned of this office, at #413-755-2280, or Larry Hanson of this office, at #413-755-2287.

Sincerely,

Daniel Hall
Section Chief
Solid Waste Management

DH/LGH/lgh
Word:yankeemonmod216
Certified Mail, #7011 0470 0001 8408 0225
cc: Rowe Board of Selectmen
Rowe Board of Health
MA DPH – Radiation Control Program – Michael Whalen
USEPA, Region 1
NRC
DEP/WERO – Michael Gorski, David Howland, Eva Tor
Franklin Regional Council of Governments
Citizens Awareness Network – Deborah Katz

APPENDIX B

FIELD DATA RECORDS – MAY 2021

FIELD INSTRUMENTATION CALIBRATION RECORD

PROJECT NAME: Yankee Rowe
PROJECT & TASK NUMBER: 3616206117
PROJECT LOCATION (City/State): MASS
WEATHER CONDITIONS (AM): Sunny/warm ≈ 60°F
WEATHER CONDITIONS (PM): SUN 75°F

DATE: 5/19/21
SAMPLER: SJM
AM CAL. CHECK TIME: 0842
PM CAL. CHECK TIME: 1715
CHECKED BY: DCL DATE 5/21/20~~21~~

MULTI-PARAMETER WATER QUALITY METER

METER TYPE: YSI
MODEL NO.: 556 MPS
UNIT ID NO.: M015-~~1~~

AM CALIBRATION: Start Time 0842 End Time 0946
PM CALIBRATION: Start Time 1715 End Time 17:40

	Units	Standard Value	Meter Value	*Acceptance Criteria (AM)	Standard Value	Meter Value	*Acceptance Criteria (PM)
Conductivity	mS/cm	1.413	1.413	1.371 - 1.455 mS/cm	1.413	1.416	1.342 - 1.484 mS/cm
pH 7	SU	7.0	7.00	6.9 - 7.1 pH Units	7.0	7.02	6.70 - 7.30 pH Units
pH 4	SU	4.0	4.00	3.9 - 4.1 pH Units	4.0	—	(Not Required)
Redox	+/- mV	240	240.0	230 - 250 mV	240	~~227.9~~ 223	230 - 250 mV
DO (Saturated)	%	100	97.3	90 - 110 %	100	105.5	90 - 110 %
DO (Zero)	%	0.0	—	0.0 - 1.0 %	0.0	—	(Not Required)
DO (Saturated)	mg/L	(1) 9.0	7.99	+/- 0.2 mg/L	(1) 9.7	8.71	+/- 0.5 mg/L
Temperature	°C	None	19.62	None	None	26.78	None
Baro. Press.	mmHg	None	737.6	None	None	740.3	None

TURBIDITY METER

METER TYPE: Hach
MODEL NO.: 2100Q
UNIT ID NO.: M024-~~92~~

	Units	Standard Value	Meter Value	Standard Value	Meter Value	*Acceptance Criteria (PM)
10 Standard	NTU	10	10.4	10	8.92	9.5 - 10.5 NTU
20 Standard	NTU	20	19.8	20	17.4	19.0 - 21.0 NTU
100 Standard	NTU	100	94.3	100	~~98.9~~	95.0 - 105 NTU
800 Standard	NTU	800	~~792~~	800	~~783~~	760 - 840 NTU

PHOTOIONIZATION DETECTOR

METER TYPE: NA
MODEL NO.:
UNIT ID NO.:

	Units	Standard Value	Meter Value	Standard Value	Meter Value	
Background	ppmv	<0.1	NA	<0.1		0.0 - 5.1 ppmv
Span Gas	ppmv	100		100		90 - 110 ppmv

O_2-LEL 4 GAS METER

METER TYPE: NA
MODEL NO.:
UNIT ID NO.:

	Units	Standard Value	Meter Value	Standard Value	Meter Value	
Methane	%	50	NA	50		45.0 - 55.0 %
O_2	%	20.9		20.9		18.8 - 23.0 %
H_2S	ppmv	25		25		22.5 - 27.5 %
CO	ppmv	50		50		45.0 - 55.0 %

OTHER METER

METER TYPE:
MODEL NO.:
UNIT ID NO.:

Units	Standard Value	Meter Value	Standard Value	Meter Value	
					See Notes Below for Additional Information

☐ Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.
☑ Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source:	-NA-
Lot#/Date Produced:	-NA-
Trip Blank Source:	lab
Sample Preservatives Source:	lab
Disposable Filter Type:	-NA-
Calibration Standards Source:	FOS

	Cal. Standard Lot Number	Exp. Date
Conductivity	065968	10/21
pH 7.0	065268	10/22
pH 4.0	063904	10/22
Redox	063306	5/21
DO (Zero)	—	—
10 NTU	41096	~~7/22~~
20 NTU	41069	6/23
100 NTU	41069	6/23
800 NTU	41082	8/22
Cal Gas.	na	na
Other	na	na

NOTES: AM DO (mg/L) not in range
PM DO (mg/L) not in range
PM 10, 20 Turb. not in range

SAMPLER SIGNATURE: René Arbet

wood.
1090 Elm Street
2nd Floor, Suite 201
Rocky Hill, CT. 06067
(860)529-7191

(1) Value from "Saturated dissolved oxygen in water at various temperatures" chart.

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additonal acceptance criteria obtained from instrument specific manufacturer recommendations.

** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.

WATER QUALITY MONITOR CALIBRATION FORM (SAMPLE)

Form 3

Make/Model: YSI 556 MPS

Serial #	Date	Time	Temperature	Standard	Pass	Fail	Initials	COMMENTS
MO15-11	5/19/21	0906	18.53	—			SM	
				1.413	✓			
				7.0	✓			
				4.0	✓			
				240	✓			
				100	✓			
				0.0	✓			
				9.0	✓	✓		
				~~10.4~~ SM 10	✓			
				~~19.8~~ SM 20	✓			
				~~99.3~~ SM 100	✓			
				800	✓			

FIELD INSTRUMENTATION CALIBRATION RECORD

PROJECT NAME:	Yankee Rowe	DATE:	5/19/21
PROJECT & TASK NUMBER:	3616206117	SAMPLER:	DLL
PROJECT LOCATION (City/State):	MASS	AM CAL. CHECK TIME:	0842
WEATHER CONDITIONS (AM):	Sun 75°F	PM CAL. CHECK TIME:	17.00
WEATHER CONDITIONS (PM):	Sun 80°F	CHECKED BY: SSM	DATE 5/21/20

MULTI-PARAMETER WATER QUALITY METER

METER TYPE: YSI
MODEL NO.: 556 MPS
UNIT ID NO.: M015-09

AM CALIBRATION — Start Time 0843 — End Time 0915

	Units	Standard Value	Meter Value	*Acceptance Criteria (AM)
Conductivity	mS/cm	1.413	1.413	1.371 - 1.455 mS/cm
pH 7	SU	7.0	7.00	6.9 - 7.1 pH Units
pH 4	SU	4.0	4.00	3.9 - 4.1 pH Units
Redox	+/- mV	240	240.0	230 - 250 mV
DO (Saturated)	%	100	97.5	90 - 110 %
DO (Zero)	%	0.0	-	0.0 - 1.0 %
DO (Saturated)	mg/L	(1) 9.0	9.65	+/- 0.2 mg/L
Temperature	°C	None	19.67	None
Baro. Press.	mmHg	None	740.8	None

PM CALIBRATION — Start Time 17:05 — End Time 17:30

Standard Value	Meter Value	*Acceptance Criteria (PM)
1.413	1.417	1.342 - 1.484 mS/cm
7.0	7.0	6.70 - 7.30 pH Units
4.0		(Not Required)
240	225.0	230 - 250 mV
100	120.8	90 - 110 %
0.0	-	(Not Required)
(1) 7.7	9.56	+/- 0.5 mg/L
None	26.81	None
None	740.6	None

TURBIDITY METER

METER TYPE: Hach
MODEL NO.: 2100Q
UNIT ID NO.: M024-09

	Units	Standard Value	Meter Value	Standard Value	Meter Value	*Acceptance Criteria (PM)
10 Standard	NTU	10	9.5	10	10.1	9.5 - 10.5 NTU
20 Standard	NTU	20	20.1	20	21.0	19.0 - 21.0 NTU
100 Standard	NTU	100	102	100	103	95.0 - 105 NTU
800 Standard	NTU	800	794	800	810	760 - 840 NTU

PHOTOIONIZATION DETECTOR

METER TYPE: NA
MODEL NO.:
UNIT ID NO.:

	Units	Standard Value	Meter Value	Standard Value	Meter Value	
Background	ppmv	<0.1	NA	<0.1		0.0 - 5.1 ppmv
Span Gas	ppmv	100		100		90 - 110 ppmv

O_2-LEL 4 GAS METER

METER TYPE: NA
MODEL NO.:
UNIT ID NO.:

	Units	Standard Value	Meter Value	Standard Value	Meter Value	
Methane	%	50	NA	50		45.0 - 55.0 %
O_2	%	20.9		20.9		18.8 - 23.0 %
H_2S	ppmv	25		25		22.5 - 27.5 %
CO	ppmv	50		50		45.0 - 55.0 %

OTHER METER

METER TYPE:
MODEL NO.:
UNIT ID NO.:

		Units	Standard Value	Meter Value	Standard Value	Meter Value	
							See Notes Below for Additional Information

☐ Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.

☒ Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source:	-NA-
Lot#/Date Produced:	-NA-
Trip Blank Source:	lab
Sample Preservatives Source:	lab
Disposable Filter Type:	-NA-
Calibration Standards Source:	FOS

	Cal. Standard Lot Number	Exp. Date
Conductivity	06-5468	10/21
pH 7.0	06-5268	10/22
pH 4.0	06-5904	10/22
Redox	06-3306	7/21
DO (Zero)	-	-
10 NTU	4.4 A1013	4/22
20 NTU	A1013	4/22
100 NTU	A1020	5/22
800 NTU	A1020	5/22
Cal Gas.	na	na
Other	na	na

NOTES: PM ORP not in range
AM DO mg/L not in range
PM DO% not in range, DO mg/L not in range

SAMPLER SIGNATURE: DLL

wood.
1090 Elm Street
2nd Floor, Suite 201
Rocky Hill, CT. 06067
(860)529-7191

(1) Value from "Saturated dissolved oxygen in water at various temperatures" chart.

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additonal acceptance criteria obtained from instrument specific manufacturer recommendations.

** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.

WATER QUALITY MONITOR CALIBRATION FORM (SAMPLE)

Form 3

Make/Model: YSI 556 MPS MOIS-09

Serial #	Date	Time	Temperature	Standard	Pass	Fail	Initials	COMMENTS
NA	5/19/21	0843	19.67	1.413 mS/cm	X		SS	
				7.0 pH	X			
				4.0 pH	X			
				240.0 mV	X			
				100 %	X			
				9.0 mg/L		X		9.65
				10 NTU	X			
				20 NTU	X			
				100 NTU	X			
				800 NTU	X			

FIELD INSTRUMENTATION CALIBRATION RECORD

PROJECT NAME:	Yankee Rowe	DATE:	5/20/21
PROJECT & TASK NUMBER:	3616206117	SAMPLER:	DCL
PROJECT LOCATION (City/State):	MASS	AM CAL. CHECK TIME:	0730
WEATHER CONDITIONS (AM):	Sun 65°F.	PM CAL. CHECK TIME:	11:30
WEATHER CONDITIONS (PM):	Sun 80°F	CHECKED BY: JSM	DATE 5/21/21

MULTI-PARAMETER WATER QUALITY METER

METER TYPE: YSI
MODEL NO.: 556 MPS
UNIT ID NO.: M015-004

AM CALIBRATION — Start Time 0730 — End Time 0810

PM CALIBRATION — Start Time 11:30 — End Time 1150

	Units	Standard Value	Meter Value	*Acceptance Criteria (AM)	Standard Value	Meter Value	*Acceptance Criteria (PM)
Conductivity	mS/cm	1.413	1.413	1.371 - 1.455 mS/cm	1.413	1.405	1.342 - 1.484 mS/cm
pH 7	SU	7.0	7.0	6.9 - 7.1 pH Units	7.0	7.02	6.70 - 7.30 pH Units
pH 4	SU	4.0	4.0	3.9 - 4.1 pH Units	4.0	—	(Not Required)
Redox	+/- mV	240	240.0	230 - 250 mV	240	240.1	230 - 250 mV
DO (Saturated)	%	100	98.0	90 - 110 %	100	97.8	90 - 110 %
DO (Zero)	%	0.0	—	0.0 - 1.0 %	0.0	—	(Not Required)
DO (Saturated)	mg/L	(1) 8.4	9.41	+/- 0.2 mg/L	(1) 9.3	8.44	+/- 0.5 mg/L
Temperature	°C	None	20.67	None	None	18.44	None
Baro. Press.	mmHg	None	744.6	None	None	745.1	None

TURBIDITY METER

METER TYPE: Hach
MODEL NO.: 2100Q
UNIT ID NO.: M024-42

	Units	Standard Value	Meter Value	Standard Value	Meter Value	*Acceptance Criteria (PM)
10 Standard	NTU	10	9.88	10	11.2	9.5 - 10.5 NTU
20 Standard	NTU	20	19.0	20	25.1	19.0 - 21.0 NTU
100 Standard	NTU	100	102	100	110	95.0 - 105 NTU
800 Standard	NTU	800	802	800	832	760 - 840 NTU

PHOTOIONIZATION DETECTOR

METER TYPE: NA
MODEL NO.:
UNIT ID NO.:

	Units	Standard Value	Meter Value	Standard Value	Meter Value	
Background	ppmv	<0.1	NA	<0.1		0.0 - 5.1 ppmv
Span Gas	ppmv	100		100		90 - 110 ppmv

O_2-LEL 4 GAS METER

METER TYPE: NA
MODEL NO.:
UNIT ID NO.:

	Units	Standard Value	Meter Value	Standard Value	Meter Value	
Methane	%	50	NA	50		45.0 - 55.0 %
O_2	%	20.9		20.9		18.8 - 23.0 %
H_2S	ppmv	25		25		22.5 - 27.5 %
CO	ppmv	50		50		45.0 - 55.0 %

OTHER METER

METER TYPE:
MODEL NO.:
UNIT ID NO.:

Units	Standard Value	Meter Value	Standard Value	Meter Value	
					See Notes Below for Additional Information

☐ Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.

☒ Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source:	-NA-
Lot#/Date Produced:	-NA-
Trip Blank Source:	lab
Sample Preservatives Source:	lab
Disposable Filter Type:	-NA-
Calibration Standards Source:	FOS

	Cal. Standard Lot Number	Exp. Date
Conductivity	06J968	10/21
pH 7.0	06J268	10/22
pH 4.0	06J904	10/22
Redox	06J206	7/21
DO (Zero)		
10 NTU	A1096	7/22
20 NTU	A1069	6/22
100 NTU	A1069	6/22
800 NTU	A1092	6/22
Cal Gas.	na	na
Other	na	na

NOTES: AM DO mg/L not in range
PM Turb 10, 20, 100 not in range

SAMPLER SIGNATURE:

wood.
1090 Elm Street
2nd Floor, Suite 201
Rocky Hill, CT. 06067
(860)529-7191

(1) Value from "Saturated dissolved oxygen in water at various temperatures" chart.

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additonal acceptance criteria obtained from instrument specific manufacturer recommendations.

** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.

WATER QUALITY MONITOR CALIBRATION FORM (SAMPLE)

Form 3

Make/Model: YSI 556 MPS Turb HACH 2100 Q

Serial #	Date	Time	Temperature	Standard	Pass	Fail	Initials	COMMENTS
	5/20/21	0730	20.67	Temp °C			DS	
				1.413 mS/cm	X			
				7.0 pH	X			
				4.0 pH	X			
				240.0 mV	X			
				100%	X			
				8.9 mg/L		X		
				10	X			
				20	X			
				100	X			
				200	X			

GROUND WATER SAMPLING FIELD LOG (SAMPLE)

Form 1

Sample Location Sherman Spring Well Designation Sherman Spring (SP-1)

Sampling Team OL RA JM Sample Period 5/20/21

Date 5/20/21 Time ~~0850~~ @ 5/20/21 0825 sample time

Depth to Mid Screen _____ (ft)

Measuring Point _____ Diameter of Well _____ (in)

Well Depth (from measuring point) (D) _____ (ft)

Depth to water (DTW) _____ (ft)

Length of Water Column (LWC) NA _____ (ft) (LWC=D-DTW)

Volume of Water in Well (VW) _____ gal Conversion Factor ____

Volume of Purge (VTP) (VTP = VW x 3) _____ (gal)

At Time of Measurements:

Color Clear Odor none

Total volume purged _____ Duration of purging _____

Purging method NA Did well go dry? NA

Weather conditions sun 65°F

Pump Serial Number 5008-41 geo pump

Water Quality Monitor Serial Number YSI M015-09 Turb M024-42

Analyses Requested VOC, 1,4D RCRA 8 metals, Radionuclides, Strontium-90 Tritium

Previous Final Readings: pH — Cond — Turb — DO — Temp — ORP — DTW — Flow —

no previous readings

WATER QUALITY PARAMETERS (SAMPLE)

Form 2

Sample Round: Sherman Spring (SP-1)

5/20/21

Current Readings

Time (min)	pH	Cond mS/cm	Turb (NTU)	D.O (mg/L)	Temp (°C)	ORP (mv)	DTW (feet)	Comments
0	+/- 0.1 std. unit	+/- 3%	+/- 10% NA <10NTU	+/-10%	+/- 1 E	+/-10 mv		
5	6.63	0.236	1.34	10.72	11.74	201.2	NA	
10								
15								
20								
25								
30								
35								
40								
45								
50								
55								
60								
65								
70								
75								
80								
85								
90								
95								
100								
105								
110								
115								
120								
125								
130								
135								
140								
145								
150								
155								

GROUND WATER SAMPLING FIELD LOG (SAMPLE)

Form 1

Sample Location SW-1 Well Designation SW-1

Sampling Team DL RA SM Sample Period 5/20/21

Date 5/20/21 Time 1010 sample time

Depth to Mid Screen _____ (ft)

Measuring Point _____ Diameter of Well _____ (in)

Well Depth (from measuring point) (D) _____ (ft)

Depth to water (DTW) _____ (ft)

Length of Water Column (LWC) _____ (ft) (LWC=D-DTW)

Volume of Water in Well (VW) _____ gal Conversion Factor ____

Volume of Purge (VTP) (VTP = VW x 3) _____ (gal)

At Time of Measurements:

Color Clear Odor none

Total volume purged _____ Duration of purging _____

Purging method NA Did well go dry? NA

Weather conditions sun 65°F

Pump Serial Number 5008-41 geo pump

Water Quality Monitor Serial Number YSI M01509 Turb M024-42

Analyses Requested VOC, 1,4D Ca Fe Mn, RCRA 8 metals Alkalinity COD

Previous Final Readings: pH 7.1 Cond 0.028 Turb 0.87 DO 14.3 Temp 2.83 ORP 207 DTW — Flow —
(3/24/16)

WATER QUALITY PARAMETERS (SAMPLE)

Form 2

Sample Round	SW-1							
	5/20/21	Current Readings						
Time (min)	pH	Cond mS/cm	Turb (NTU)	D.O (mg/L)	Temp (°C)	ORP (mv)	DTW (feet)	Comments
0	+/- 0.1 std. unit	+/- 3%	+/- 10% NA <10NTU	+/-10%	+/- 1 E	+/-10 mv		
5	4.73	0.023	1.54	10.50	9.79	212.3	0.15	
10								
15								
20								
25								
30								
35								
40								
45								
50								
55								
60								
65								
70								
75								
80								
85								
90								
95								
100								
105								
110								
115								
120								
125								
130								
135								
140								
145								
150								
155								

GROUND WATER SAMPLING FIELD LOG (SAMPLE)

Form 1

Sample Location SW-4 Well Designation SW-4

Sampling Team DL RA JM Sample Period 5/20/21

Date 5/20/21 Time 1035 sample time

Depth to Mid Screen _____ (ft)

Measuring Point _____ Diameter of Well _____ (in)

Well Depth (from measuring point) (D) _____ (ft)

Depth to water (DTW) _____ (ft)

Length of Water Column (LWC) NA _____ (ft) (LWC=D-DTW)

Volume of Water in Well (VW) _____ gal Conversion Factor ____

Volume of Purge (VTP) (VTP = VW x 3) _____ (gal)

At Time of Measurements:

Color clear Odor none

Total volume purged _____ Duration of purging _____

Purging method NA Did well go dry? NA

Weather conditions sun 70°F

Pump Serial Number 5008-41 geopump

Water Quality Monitor Serial Number YSI MOIS-01 Turb Mo24-42

Analyses Requested VOC, 1,4D, CAFe Mn, RCRA8 metals Alkalinity (OS

Previous Final Readings: pH 6.13 Cond 2026 Turb 1.61 DO 13.80 Temp 3.44 ORP 144.1 DTW — Flow —
(3/24/16)

WATER QUALITY PARAMETERS (SAMPLE)

Form 2

Sample Round SW-4 5/20/21								
Current Readings								
Time (min)	pH	Cond mS/cm	Turb (NTU)	D.O (mg/L)	Temp (°C)	ORP (mv)	DTW (feet)	Comments
0	+/- 0.1 std. unit	+/- 3%	+/- 10% NA <10NTU	+/-10%	+/- 1 E	+/-10 mv		
5	4.99	0.030	3.73	11.43	10.93	173.4	0.2	
10								
15								
20								
25								
30								
35								
40								
45								
50								
55								
60								
65								
70								
75								
80								
85								
90								
95								
100								
105								
110								
115								
120								
125								
130								
135								
140								
145								
150								
155								

GROUND WATER SAMPLING FIELD LOG (SAMPLE)

Form 1

Sample Location SW-5 Well Designation SW-5

Sampling Team NL RA JM Sample Period 5/20/21

Date 5/20/21 Time 11:00 sample time

Depth to Mid Screen _____ (ft)

Measuring Point _____ Diameter of Well _____ (in)

Well Depth (from measuring point) (D) _____ (ft)

Depth to water (DTW) _____ (ft)

Length of Water Column (LWC) NA _____ (ft) (LWC=D-DTW)

Volume of Water in Well (VW) _____ gal Conversion Factor ____

Volume of Purge (VTP) (VTP = VW x 3) _____ (gal)

At Time of Measurements:

Color clear Odor none

Total volume purged NA Duration of purging _____

Purging method _____ Did well go dry? NA

Weather conditions sun 80F

Pump Serial Number S008-41 geopump

Water Quality Monitor Serial Number YSI M015-09 Turb M024-42

Analyses Requested VOC, 1,4D, CaFeMn, RCRA metals Alkalinity COD

Previous Final Readings: pH 5.99 Cond 0.00 Turb 0.82 DO 11.98 Temp 3.57 ORP 164.5 DTW — Flow —

(3/24/16)

WATER QUALITY PARAMETERS (SAMPLE)

Form 2

Sample Round	SW-5	5/20/21						
	Current Readings							
Time (min)	pH	Cond mS/cm	Turb (NTU)	D.O (mg/L)	Temp (°C)	ORP (mv)	DTW (feet)	Comments
0	+/- 0.1 std. unit	+/- 3%	+/- 10% NA <10NTU	+/-10%	+/- 1 E	+/-10 mv		
5	5.66	0.030	8.77	10.84	11.51	174.5	0.76	
10								
15								
20								
25								
30								
35								
40								
45								
50								
55								
60								
65								
70								
75								
80								
85								
90								
95								
100								
105								
110								
115								
120								
125								
130								
135								
140								
145								
150								
155								

GROUND WATER SAMPLING FIELD LOG (SAMPLE)

Form 1

Sample Location CFW-1 Well Designation CFW-1

Sampling Team DL, JM Sample Period May 2021

Date ~~5/2~~ 5/19/21 ~~5/19/21~~ Time 1025 5/19/21 – 0950 5/20/21

	Depth to Mid Screen	(ft)
Measuring Point TOR	Diameter of Well 2"	(in)
Well Depth (from measuring point) (D)	9.20	(ft)
Depth to water (DTW)	4.62	(ft)
Length of Water Column (LWC)	4.58	(ft) (LWC=D-DTW)
Volume of Water in Well (VW)	0.73 gal	Conversion Factor 0.16
Volume of Purge (VTP) (VTP = VW x 3)	2.19	(gal)

At Time of Measurements:

Color light brown	Odor No odor
Total volume purged 1.04	Duration of purging 40
Purging method Geopump	Did well go dry? Yes
Weather conditions Sunny, 70°F-80°F	

Pump Serial Number S-008-41

Water Quality Monitor Serial Number M200-74(IP), M015-09(YSI), M027-29(Turb Meter

Analyses Requested Calcium, Iron, ~~Mg~~ Manganese, Alkalinity, COD

Previous Final Readings: pH 7.76 Cond 0.026 Turb 546 DO 5.62 Temp 3.78 ORP 86.7 DTW 8.88 Flow 150 (3/24/16)

WATER QUALITY PARAMETERS (SAMPLE)

Form 2

Sample Round 8 May 19th, 2021
CFW-1

Current Readings

Time (min)	pH	Cond mS/cm	Turb (NTU)	D.O (mg/L)	Temp (°C)	ORP (mv)	DTW (feet)	Comments
1050 0	+/- 0.1 std. unit	+/- 3%	+/- 10% NA <10NTU	+/-10%	+/- 1 E	+/-10 mv	4.62	well ID / Purge begin CFW1 / 1050
1100 5	4.18	0.026	89.1	2.78	4.50	122.5	4.95	110 ml/min
1105 10	4.16	0.025	77.1	2.94	4.45	135.2	5.05	↓
1110 15	4.21	0.025	78.1	4.26	9.51	127.5	5.50	
1115 20	4.33	0.025	92.4	3.60	4.35	123.7	6.74	
1120 25	4.28	0.027	95.9	2.76	4.36	125.7	7.45	
1125 30	-	-	-	-	-	-	-	Missed reading
1130 35	4.32	0.025	401.0	2.28	4.71	132.4	8.26	
1135 40	-	-	-	-	-	-	-	1135 well dry
1140 45								returned @
50								to grab sample
55	5/20/21	Return to well, take grab sample DTW 3.37 @ 0950						
60								
65								
70								
75								
80								
85								
90								
95								
100								
105								
110								
115								
120								
125								
130								
135								
140								
145								
150								
155								

GROUND WATER SAMPLING FIELD LOG (SAMPLE)

Form 1

Sample Location CFW-5 @ Dup MS MSD Well Designation CFW-3

Sampling Team DL, JM Sample Period May 2021

Date 5/19/21 Time 1196

Measuring Point TOR

Depth to Mid Screen _____ (ft)

Diameter of Well 2 (in)

Well Depth (from measuring point) (D) 5/19/21 ~~4.75~~ 8.63 (ft)

Depth to water (DTW) 4.75 (ft)

Length of Water Column (LWC) 3.88 (ft) (LWC=D-DTW)

Volume of Water in Well (VW) 0.62 gal Conversion Factor 0.16

Volume of Purge (VTP) (VTP = VW x 3) (8) 5/19/21 ~~1.55~~ 1.86 (gal)

At Time of Measurements:

Color Clear

Odor none

Total volume purged 2.55 gal

Duration of purging 70 mins

Purging method geopump

Did well go dry? no

Weather conditions sun 75°F

Pump Serial Number S-008-41

Water Quality Monitor Serial Number M200-74 M015-091 (YSI) M027-29 (Turb)

Analyses Requested Ca Fe Mn, COD, Alkalinity

Previous Final Readings: pH 7.61 Cond 0.232 Turb 6.81 DO 4.11 Temp 5.22 ORP 0.7 DTW 4.98 Flow 140 (3/24/16)

WATER QUALITY PARAMETERS (SAMPLE)

Form 2

Sample Round May 2021 5/19/21 CFW-5

Current Readings

Time (min)	pH	Cond mS/cm	Turb (NTU)	D.O (mg/L)	Temp (°C)	ORP (mv)	DTW (feet)	Comments
0 1150 5/19/21 (FM)	+/- 0.1 std. unit	+/- 3%	+/- 10% NA <10NTU	+/-10%	+/- 1 E	+/-10 mv	4.75	well ID CFW-5
1155 ~~1155~~ 5	5.32	0.28	29.2	1.09	10.20	92.7	4.98	140ml/min
1200 10	5.31	0.28	17.9	0.91	10.18	84.5	4.98	
1205 15	5.40	0.28	14.1	0.87	9.97	85.1	5.00	
1210 20	5.48	0.28	15.2	1.85	9.44	84.0	5.00	
1215 25	5.53	0.28	15.1	2.89	9.68	78.8	5.00	
1220 30	5.59	0.28	10.9	2.30	10.02	81.0	5.00	
1225 35	5.61	0.28	14.0	2.01	9.81	78.0	5.00	
1230 40	5.64	0.28	12.7	1.45	9.78	79.6	5.00	
1235 45	5.65	0.28	12.0	1.16	9.58	79.5	5.00	
1240 50	5.66	0.28	9.75	1.38	9.85	78.3	5.00	
1245 55	5.68	0.289	11.7	1.38	10.07	74.2	5.00	
1250 60	5.71	0.241	8.84	1.03	9.95	72.2	5.00	
1255 65	5.72	0.241	9.21	1.08	9.90	70.3	5.00	
1300 70	5.74	0.242	9.98	1.00	9.89	70.4	5.00	
1301 75	collect samples. well stable							
80								
85								
90								
95								
100								
105								
110								
115								
120								
125								
130								
135								
140								
145								
150								
155								

GROUND WATER SAMPLING FIELD LOG (SAMPLE)

Form 1

Sample Location CPW-6 Well Designation CPW-6

Sampling Team 5/19/21 JM, DC Sample Period May 21

Date 5/~~18~~19/21 Time 1330

Depth to Mid Screen _____ (ft)

Measuring Point TOR Diameter of Well 2" (in)

Well Depth (from measuring point) (D) 5/19/21 5.24 ~~8.70~~ (ft)

Depth to water (DTW) 5.24 (ft)

Length of Water Column (LWC) 3.46 (ft) (LWC=D-DTW)

Volume of Water in Well (VW) 0.55 gal Conversion Factor 0.16

Volume of Purge (VTP) (VTP = VW x 3) 1.65 (gal)

At Time of Measurements:

Color Clear Odor No odor

Total volume purged 1.001 Duration of purging 35 mins

Purging method Grapump Did well go dry? No

Weather conditions Sunny, 80

Pump Serial Number S-008-41

Water Quality Monitor Serial Number M200-74, M015-09 (YSI), M027-276 Turb

Analyses Requested CaFeMn, COD, Alkalinity

Previous Final Readings: pH 6.88 Cond 0088 Turb 1.55 DO 3.12 Temp 6.00 ORP 116.6 DTW 5.76 Flow 150 (3/24/16)

WATER QUALITY PARAMETERS (SAMPLE)

Form 2

Sample Round: May 2021

CFW-6

Current Readings

Time (min)	pH	Cond mS/cm	Turb (NTU)	D.O (mg/L)	Temp (°C)	ORP (mv)	DTW (feet)	Comments
0 1335	+/- 0.1 std. unit	+/- 3%	+/- 10% NA <10NTU	+/-10%	+/- 1 E	+/-10 mv	5.24	cfw-6,
1340 5	4.51	0.08	10.2	3.67	10.00	3.66	5.79	110ml/m
1345 10	4.59	0.09	4.64	3.69	10.41	3.72	5.82	
1350 15	4.72	0.09	3.68	4.03	10.08	147.0	5.88	
1355 20	4.79	0.09	3.18	3.87	9.96	144.6	5.90	
1400 25	4.82	0.08	1.89	4.67	9.99	142.4	5.95	
1405 30	4.87	0.08	1.90	4.87	10.00	141.8	5.96	
1410 35	4.89	0.08	1.92	4.90	9.96	141.5	5.99	
1415 40	–	–	–	–	–	–	–	1410, well stabilized
1420 45	Well	Stabilized,	Samples	collected				
1425 50								
55								
60								
65								
70								
75								
80								
85								
90								
95								
100								
105								
110								
115								
120								
125								
130								
135								
140								
145								
150								
155								

GROUND WATER SAMPLING FIELD LOG (SAMPLE)

Form 1

Sample Location MW-105B Well Designation MW-105B

Sampling Team RENE AUBE Sample Period MAY 2021

Date 5/19/21 Time 1355-1650

Depth to Mid Screen — (ft)

Measuring Point TOR Diameter of Well 2 (in)

Well Depth (from measuring point) (D) 75.68 (ft)

Depth to water (DTW) 22.96 (ft)

Length of Water Column (LWC) 52.72 (ft) (LWC=D-DTW)

Volume of Water in Well (VW) 8.44 gal Conversion Factor .16

Volume of Purge (VTP) (VTP = VW x 3) 25.32 (gal)

At Time of Measurements:

Color CLEAR Odor NONE

Total volume purged 3.3 gallons Duration of purging 125 MIN

Purging method BLADDER PUMP Did well go dry? NO

Weather conditions SUNNY, WARM, BREEZY

Pump Serial Number # 31695

Water Quality Monitor Serial Number MQ15-11

Analyses Requested TRITIUM

Previous Final Readings: pH 7.06 Cond 0.605 Turb 0.56 DO 0.54 Temp 10.51 ORP 67.9 DTW 21.10 Flow 0

WATER QUALITY PARAMETERS (SAMPLE)

Form 2

Sample Round: MAY 2021 — MW-105B

Current Readings: 5/19/21 — 1355-1650

TIME (24 HR) Time (min)	pH	Cond mS/cm	Turb (NTU)	D.O (mg/L)	Temp (°C)	ORP (mv)	DTW (feet)	Comments
0	+/- 0.1 std. unit	+/- 3%	+/- 10% NA <10NTU	+/-10%	+/- 1 E	+/-10 mv		1420 BEGIN PURGE 100 ML/MIN
5								
10								
1435 15	7.74	0.551	3.63	4.57	14.35	151.5	24.78	
1440 20	7.62	0.547	3.85	3.81	14.73	-168.4	25.15	
1445 25	7.56	0.544	3.22	3.45	14.72	-178.3	25.40	
1450 30	7.50	0.541	1.91	3.07	14.70	-186.4	25.68	
1455 35	7.46	0.540	1.97	2.72	14.62	-190.2	25.93	
1500 40	7.43	0.536	2.04	2.49	14.75	-194.0	26.10	
1505 45	7.41	0.534	1.98	2.23	14.89	-196.2	26.33	
1510 50	7.38	0.534	1.93	2.02	14.62	-198.0	26.55	
1515 55	7.37	0.533	1.90	1.81	14.68	-196.7	26.70	
1520 60	7.36	0.533	1.89	1.67	14.40	-194.7	26.87	
1525 65	7.37	0.533	1.77	1.53	14.40	-195.0	27.02	
1530 70	7.37	0.534	1.56	1.36	14.49	-195.0	27.16	
1535 75	7.37	0.536	1.50	1.25	14.26	-195.1	27.28	
1540 80	7.37	0.536	1.47	1.14	14.31	-195.0	27.39	
1545 85	7.38	0.538	1.23	1.07	14.27	-195.2	27.51	
1550 90	7.38	0.538	1.05	0.98	14.26	-192.8	27.60	
1555 95	7.39	0.538	1.16	0.89	14.33	-192.6	27.69	
1600 100	7.39	0.537	1.22	0.83	14.40	-192.6	27.77	
1605 105	7.40	0.538	1.23	0.79	14.42	-191.9	27.80	
1610 110	7.40	0.537	1.20	0.77	14.46	-190.5	27.81	
1615 115	7.40	0.536	1.22	0.70	14.44	-189.1	27.82	
1620 120	7.40	0.537	1.19	0.71	14.40	-189.0	27.82	
1625 125	7.40	0.537	1.20	0.69	14.39	-188.3	27.82	
1626 130	COLLECT SAMPLE.							
135								
140								
145								
150								
155								

CPM: 2
PRESS: 45

DISCHARGE: 3.0
REFILL: 27.0

GROUND WATER SAMPLING FIELD LOG (SAMPLE)

Form 1

Sample Location MW-107C Well Designation MW-107C

Sampling Team RENE AUBE Sample Period MAY 2021

Date 5/19/21 Time 1030-1335

Depth to Mid Screen — (ft)

Measuring Point TOR Diameter of Well 2.0 (in)

Well Depth (from measuring point) (D) 42.95 (ft)

Depth to water (DTW) 22.34 (ft)

Length of Water Column (LWC) 20.61 (ft) (LWC=D-DTW)

Volume of Water in Well (VW) 3.30 gal Conversion Factor 0.16

Volume of Purge (VTP) (VTP = VW x 3) 9.90 (gal)

At Time of Measurements:

Color CLEAR Odor NONE

Total volume purged 3.38 Duration of purging 130 MIN

Purging method BLADDER PUMP Did well go dry? NO

Weather conditions SUNNY, WARM, BREEZY

Pump Serial Number # 30623

Water Quality Monitor Serial Number MO15-11

Analyses Requested TRITIUM

Previous Final Readings: pH 6.91 Cond 0.43 Turb 0.1 DO 0.5 Temp 10.1 ORP 57.2 DTW 21.23 Flow 0.0

WATER QUALITY PARAMETERS (SAMPLE)

Form 2

Sample Round MAY 2021 MW-107C

5/19/21 Current Readings 1030 - 1335

TIME (24 HR)	Time (min)	pH	Cond mS/cm	Turb (NTU)	D.O (mg/L)	Temp (°C)	ORP (mv)	DTW (feet)	Comments
	0	+/- 0.1 std. unit	+/- 3%	+/- 10% NA <10NTU	+/-10%	+/- 1 E	+/-10 mv		1105 BEGIN PURGE 100 ML/MIN
	5			6.81					
1115	10	7.20	0.401	~~13.5~~ RDA 5/19/21	3.56	13.54	148.4	24.30	
1120	15	7.20	0.400	6.30	3.46	13.63	144.6	24.79	
1125	20	7.20	0.394	5.82	3.42	13.42	140.2	25.28	
1130	25	7.20	0.393	6.76	3.34	13.28	136.9	25.66	
1135	30	7.20	0.392	6.33	3.31	13.15	134.3	26.11	
1140	35	7.20	0.390	6.15	3.25	13.07	131.6	26.48	
1145	40	7.21	0.389	5.94	3.29	13.20	129.3	26.81	
1150	45	7.21	0.388	5.78	3.21	13.31	126.7	27.10	
1155	50	7.21	0.388	5.62	3.06	13.28	121.3	27.40	
1200	55	7.21	0.388	5.55	2.93	13.33	117.0	27.56	
1205	60	7.22	0.387	6.00	2.87	13.22	108.2	27.78	
1210	65	7.22	0.386	6.63	2.74	13.30	99.0	27.95	
1215	70	7.22	0.386	6.77	2.63	13.55	89.4	28.13	
1220	75	7.22	0.386	6.92	2.52	13.34	80.2	28.31	
1225	80	7.22	0.386	6.70	2.38	13.45	67.2	28.42	
1230	85	7.23	0.386	6.63	2.24	13.47	58.6	28.53	
1235	90	7.23	0.386	6.57	2.09	13.52	49.4	28.62	
1240	95	7.23	0.386	5.67	1.96	13.48	41.4	28.73	
1245	100	7.23	0.386	5.11	1.77	13.49	30.8	28.80	
1250	105	7.23	0.386	4.70	1.70	13.51	21.2	28.85	
1255	110	7.23	0.386	4.24	1.66	13.55	13.7	28.88	
1300	115	7.23	0.386	3.88	1.64	13.60	7.0	28.90	
1305	120	7.23	0.386	3.81	1.59	13.67	4.2	28.92	
1310	125	7.23	0.386	3.77	1.56	13.71	2.1	28.92	
1315	130	7.23	0.386	3.75	1.51	13.74	0.3	28.92	
1316	135	COLLECT	SAMPLE						
	140								
	145								
	150								
	155								

CPM: 2 DISCHARGE: 2.0
PRESS: 33 REFILL: 28.0

APPENDIX C

ANALYTICAL DATA – MAY 2021

APPENDIX C-1

RADIOLOGICAL DATA - MAY 2021

APPENDIX C-1
Radiological Data - May 2021

Yankee Nuclear Power Station

		Sample Delivery Group		545280			545280			545280		
		Location		MW-105B			MW-107C			SP-1		
		Sample Date		5/19/2021			5/19/2021			5/20/2021		
		Sample ID		MW-105B			MW-107C			SP-1		
		Qc Code		FS			FS			FS		
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Uncertainty	Result	Qualifier	Uncertainty	Result	Qualifier	Uncertainty
E901.1	N	Antimony-125	PCI/L							30	U	3.11
E901.1	N	Cesium-134	PCI/L							10	U	1.23
E901.1	N	Cesium-137	PCI/L							20	U	1.58
E901.1	N	Cobalt-60	PCI/L							10	U	1.47
E901.1	N	Europium-152	PCI/L							20	U	3.76
E901.1	N	Europium-154	PCI/L							30	U	3.6
E901.1	N	Europium-155	PCI/L							60	U	5.38
E901.1	N	Niobium-94	PCI/L							50	U	1.28
E901.1	N	Silver-108	PCI/L							15	U	1.11
E905.0	N	Strontium-90	PCI/L							2	U	0.475
E906.0	N	Tritium	PCI/L	1,020		385	2,630		658	700	U	256

NOTES:
pCi/L = picocurie per liter
U = not detected at the reported quanitation limit
FS = field sample

APPENDIX C-2

CHEMICAL DATA – MAY 2021

APPENDIX C-2
Chemical Data - May 2021

Yankee Nuclear Power Station

		Sample Delivery Group		545280		545280		545280		545280		545280		545280		545280		545280	
		Location		CFW-1		CFW-5		CFW-5		CFW-6		QC		SP-1		SW-1		SW-4		SW-5	
		Sample Date		5/20/2021		5/19/2021		5/19/2021		5/19/2021		5/20/2021		5/20/2021		5/20/2021		5/20/2021		5/20/2021	
		Sample ID		CFW-1		CFW-5		CFW-5 DUP		CFW-6		TB-009		SP-1		SW-1		SW-4		SW-5	
		Qc Code		FS		FS		FD		FS		TB		FS		FS		FS		FS	
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW8260D	N	1,1,1,2-Tetrachloroethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1,1-Trichloroethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1,2,2-Tetrachloroethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1,2-Trichloroethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1-Dichloroethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1-Dichloroethene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2,4-Trichlorobenzene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2-Dibromoethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2-Dichlorobenzene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2-Dichloroethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2-Dichloropropane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,3-Dichlorobenzene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,3-Dichloropropene (total)	MG/L									0.002	U	0.002	U	0.002	U	0.002	U	0.002	U
SW8260D	N	1,4-Dichlorobenzene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	2-Butanone	MG/L									0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
SW8260D	N	4-Methyl-2-pentanone	MG/L									0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
SW8260D	N	Acetone	MG/L									0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
SW8260D	N	Benzene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Bromodichloromethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Bromoform	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Bromomethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Carbon tetrachloride	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Chlorobenzene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Chloroform	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	cis-1,2-Dichloroethene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Dibromochloromethane	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Ethylbenzene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Methyl Tertbutyl Ether	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Methylene chloride	MG/L									0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
SW8260D	N	Naphthalene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Styrene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Tetrachloroethene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Toluene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	trans-1,2-Dichloroethene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Trichloroethene	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Vinyl chloride	MG/L									0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Xylenes, Total	MG/L									0.003	U	0.003	U	0.003	U	0.003	U	0.003	U
SW8270E-SIM	N	1,4-Dioxane	UG/L											0.4	U	0.4	U	0.4	U	0.4	U
SW6020	T	Calcium	MG/L	1.58		27.2		28.4		10.2						2.21		2.94		3.56	
SW6020	T	Iron	MG/L	7.37		33.9		35.4		3.41						0.104		12.5		30.7	
SW6020	T	Manganese	MG/L	0.203		2.66		2.72		1.74						0.0132		0.25		0.338	
SW7470A	D	Mercury	MG/L											0.0002	U	0.0002	U	0.0002	U	0.0002	UJ
SW6020	D	Arsenic	MG/L											0.005	U	0.005	U	0.005	U	0.005	U
SW6020	D	Barium	MG/L											0.0222		0.00956		0.0132		0.0126	
SW6020	D	Cadmium	MG/L											0.001	U	0.001	U	0.001	U	0.001	U
SW6020	D	Chromium	MG/L											0.01	U	0.01	U	0.01	U	0.01	U
SW6020	D	Lead	MG/L											0.002	U	0.002	U	0.002	U	0.002	U
SW6020	D	Selenium	MG/L											0.005	U	0.005	U	0.005	U	0.005	U
SW6020	D	Silver	MG/L											0.001	U	0.001	U	0.001	U	0.001	U
E410.4	N	Chemical Oxygen Demand	MG/L	20	U	41.6		45.8		29.1						17.2	J	12.2	J	12.2	J
SM2320B	N	Total Alkalinity, as CaCO3	MG/L	5.74		115		119		31.1						6.53		8.51		9.31	J

NOTES:
D = dissolved
T, N = total
MG/L = milligram per liter
U = not detected at the reported quanitation limit
J = concentration is estimated
J+ = concentration is estimated with potential high bias
FS = field sample, FD = field duplicate, TB = trip blank

Prepared by: WCG 6/18/21
Checked by JAR 6/21/21

APPENDIX C-3

VALIDATION CHECKLISTS – MAY 2021

DATA VALIDATION SUMMARY
MAY 2021 SAMPLING
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

1.0 INTRODUCTION

Groundwater and surface water samples were collected May 19-20, 2021, at the Yankee Nuclear Power Station, located in Rowe, Massachusetts. Sample analyses for all parameters were performed by GEL Laboratories, located in Charleston, South Carolina. Samples were analyzed by one or more of the following United States Environmental Protection Agency (USEPA) methods:

- Volatile Organic Compounds (VOCs) by Method 8260D
- 1,4-Dioxane by Method 8270E Selected Ion Monitoring (SIM)
- RCRA Metals (dissolved) by Methods 6020B/7470A
- Calcium, iron, and manganese by Method 6020B
- Alkalinity by Method 2320B
- Chemical Oxygen Demand (COD) by Method 410.4
- Isotopes by Gamma Spectroscopy Method 901.1
- Strontium-90 by Method 905.0 Modified
- Tritium by Method 906.0 Modified

A chemist review was performed on the samples in the data set using information supplied by the laboratory. Chemistry data were validated using guidance for Stage 2A data validation (USEPA, 2009) identified in the Region 1 EPA-New England Environmental Data Review Program Guidance (USEPA, 2018) and the USEPA National Functional Guidelines (USEPA, 2017a; USEPA, 2017b). Radiochemistry data were validated in accordance with the Yankee Nuclear Power Station (YNPS) Site procedure ES-4, Revision 1 (YNPS, 2021).

Results were reported in GEL sample delivery group (SDG) 545280. A listing of samples included in this chemistry review is presented in Table 1. A summary of the analytical results is presented in Table 2.

The following data qualifiers are used in the final data presentation:

U = target analyte is not detected at or above the reported detection limit or is qualified as not detected
J = concentration is estimated
J+ = concentration is estimated with potential high bias

Documentation of validation actions is presented in Table 3. Results are interpreted to be usable as reported by the laboratory unless discussed in the following sections.

2.0 DATA REVIEW SUMMARY

2.1 VOCs

Data were evaluated for the following parameters:

* Collection and Preservation
* Holding Times
* Data Completeness
* Surrogate Recoveries

* Blank Contamination
* Laboratory Control Samples (LCS)
* Miscellaneous

* - all criteria were met for this parameter

The results of all associated quality control measurements were within control limits, and sample results were determined to be usable as reported by the laboratory.

2.2 1,4-Dioxane

Data were evaluated for the following parameters:

* Collection and Preservation
* Holding Times
* Data Completeness
* Surrogate Recoveries
* Blank Contamination
* LCS
* Miscellaneous

* - all criteria were met for this parameter

The results of all associated quality control measurements were within control limits, and sample results were determined to be usable as reported by the laboratory.

2.3 Metals

Data were evaluated for the following parameters:

* Collection and Preservation
  Holding Times
* Data Completeness
  Blank Contamination
* Field Duplicates
* LCS
* Matrix Spike/Matrix Spike Duplicate (MS/MSD)
  Miscellaneous

* - all criteria were met for this parameter

With the following exception, results of all associated quality control measurements were within control limits, and sample results were determined to be usable as reported by the laboratory.

<u>Holding Times</u>

Due to laboratory error, sample SW-5 was initially analyzed for total RCRA metals, including mercury rather than dissolved RCRA metals as requested on the chain of custody (COC). The laboratory analyzed the field filtered sample on June 24, 2021, seven days after expiration of the holding time (28 days). The reporting limit for dissolved mercury in sample SW-5 was qualified estimated (UJ) and the result is included in Table 3 with reason code HT.

Blank Contamination

Mercury (0.000187 J mg/L) was reported in the method blank associated with samples SP-1, SW-1, and SW-4. Low concentration detections less than the reporting limit (0.0002 mg/L) for mercury were qualified non-detect (U) at the reporting limit in samples SP-1, SW-1, and SW-4. Qualified results are summarized in Table 3.

Miscellaneous

Surface water samples SW-1, SW-4, and SW-5 were initially analyzed for metals using the incorrect fraction (total, dissolved) for some of the metals. As a result, sample SW-1 was reanalyzed for total calcium, iron, and manganese using the total metals container, sample SW-4 was reanalyzed for dissolved RCRA metals by Method 6020 using the filtered metals container, and sample SW-5 was reanalyzed for dissolved RCRA metals by Methods 6020 and 7470A using the filtered metals container. Results from the reanalyses have been reported in the final data set.

2.4 Wet Chemistry

Data were evaluated for the following parameters:

* Collection and Preservation
* Holding Times
* Data Completeness
* Blank Contamination
* Duplicates
* Field Duplicates
* LCS
* MS
* Miscellaneous

* - all criteria were met for this parameter

The results of all associated quality control measurements were within control limits, and sample results were determined to be usable as reported by the laboratory.

2.5 Radiological Parameters

Data were evaluated for the following parameters:

* Collection and Preservation
* Holding Times
* Data Completeness
* Blank Contamination
* Duplicates
* LCS
* MS
* Miscellaneous

* - all criteria were met for this parameter

The results of all associated quality control measurements were within control limits, and sample results were determined to be usable as reported by the laboratory.

References:

USEPA, 2009. "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use"; Office of Solid Waste and Emergency Response; EPA-540-R-08-005; January 2009.

USEPA, 2017a. "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Data Review"; Office of Emergency and Remedial Response; EPA-540-/R-2017-002; January 2017.

USEPA, 2017b. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review"; Office of Superfund Remediation and Technology Innovation; EPA-540-R-2017-001; January 2017.

USEPA, 2018. "Region I EPA-New England Environmental Data Review Program Guidance"; Office of Environmental Measurement and Evaluation (OEME); June 2018.

YNPS, 2021. "YNPS Groundwater Monitoring Program." ISFSI Environmental, Safety and Health, ES-4; Revision 1; February 2021.

Data Validator: Julie Ricardi June 28, 2021

Senior Reviewed: Chris Ricardi, NRCC-EAC June 28, 2021

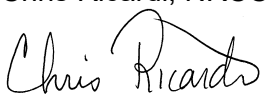

TABLE 1 - SUMMARY OF SAMPLES AND ANALYTICAL METHODS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSCHUSETTS

MAY 2021 SAMPLING EVENT

						Method Class	VOCs	1,4-Dioxane	Metals		Mercury	COD	Alkalinity	RAD		
						Analysis Method	SW8260D	SW8270E-SIM	SW6020	SW6020	SW7470A	E410.4	SM2320B	E901.1	E905.0	E906.0
						Fraction	N	N	T	D	D	N	N	N	N	N
SDG	**Location**	**Field Sample ID**	**Field Sample Date**	**Media**	**Lab Sample ID**	**QC Code**										
545280	CFW-1	CFW-1	5/20/2021	GW	545280006	FS			3			1	1			
545280	CFW-5	CFW-5	5/19/2021	GW	545280004	FS			3			1	1			
545280	CFW-5	CFW-5 DUP	5/19/2021	GW	545280005	FD			3			1	1			
545280	CFW-6	CFW-6	5/19/2021	GW	545280003	FS			3			1	1			
545280	MW-105B	MW-105B	5/19/2021	GW	545280002	FS										1
545280	MW-107C	MW-107C	5/19/2021	GW	545280001	FS										1
545280	QC	TB-009	5/20/2021	BW	545280011	TB	37									
545280	SP-1	SP-1	5/20/2021	GW	545280007	FS	37	1		7	1			9	1	1
545280	SW-1	SW-1	5/20/2021	SW	545280008	FS	37	1	3	7	1	1	1			
545280	SW-4	SW-4	5/20/2021	SW	545280009	FS	37	1	3	7	1	1	1			
545280	SW-5	SW-5	5/20/2021	SW	545280010	FS	37	1	3	7	1	1	1			

NOTES:
T, N = total, D = dissolved
FS = field sample, FD = field duplicate, TB = trip blank
GW = groundwater
SW = surface water
BW = blank water
RAD = radiological parameters
COD = chemical oxygen demand

Prepared by: WCG 6/16/21
Checked by: JAR 6/21/21

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

MAY 2021 - VOCs

			Sample Delivery Group	545280		545280		545280		545280	
			Location	QC		SP-1		SW-1		SW-4	
			Sample Date	5/20/2021		5/20/2021		5/20/2021		5/20/2021	
			Sample ID	TB-009		SP-1		SW-1		SW-4	
			Qc Code	TB		FS		FS		FS	
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW8260D	N	1,1,1,2-Tetrachloroethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1,1-Trichloroethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1,2,2-Tetrachloroethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1,2-Trichloroethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1-Dichloroethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,1-Dichloroethene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2,4-Trichlorobenzene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2-Dibromoethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2-Dichlorobenzene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2-Dichloroethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,2-Dichloropropane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,3-Dichlorobenzene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	1,3-Dichloropropene (total)	MG/L	0.002	U	0.002	U	0.002	U	0.002	U
SW8260D	N	1,4-Dichlorobenzene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	2-Butanone	MG/L	0.005	U	0.005	U	0.005	U	0.005	U
SW8260D	N	4-Methyl-2-pentanone	MG/L	0.005	U	0.005	U	0.005	U	0.005	U
SW8260D	N	Acetone	MG/L	0.005	U	0.005	U	0.005	U	0.005	U
SW8260D	N	Benzene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Bromodichloromethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Bromoform	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Bromomethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Carbon tetrachloride	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Chlorobenzene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Chloroform	MG/L	0.001	U	0.001	U	0.001	U	0.001	U

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

MAY 2021 - VOCs

			Sample Delivery Group	545280		545280		545280		545280	
			Location	QC		SP-1		SW-1		SW-4	
			Sample Date	5/20/2021		5/20/2021		5/20/2021		5/20/2021	
			Sample ID	TB-009		SP-1		SW-1		SW-4	
			Qc Code	TB		FS		FS		FS	
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW8260D	N	cis-1,2-Dichloroethene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Dibromochloromethane	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Ethylbenzene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Methyl Tertbutyl Ether	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Methylene chloride	MG/L	0.005	U	0.005	U	0.005	U	0.005	U
SW8260D	N	Naphthalene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Styrene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Tetrachloroethene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Toluene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	trans-1,2-Dichloroethene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Trichloroethene	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Vinyl chloride	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW8260D	N	Xylenes, Total	MG/L	0.003	U	0.003	U	0.003	U	0.003	U

NOTES:
VOCs = volatile organic compounds
N = total
mg/L = milligram per liter
U = not detected at the reported quanitation limit
FS = field sample, TB = trip blank

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

MAY 2021 - VOCs

			Sample Delivery Group	545280	
			Location	SW-5	
			Sample Date	5/20/2021	
			Sample ID	SW-5	
			Qc Code	FS	
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier
SW8260D	N	1,1,1,2-Tetrachloroethane	MG/L	0.001	U
SW8260D	N	1,1,1-Trichloroethane	MG/L	0.001	U
SW8260D	N	1,1,2,2-Tetrachloroethane	MG/L	0.001	U
SW8260D	N	1,1,2-Trichloroethane	MG/L	0.001	U
SW8260D	N	1,1-Dichloroethane	MG/L	0.001	U
SW8260D	N	1,1-Dichloroethene	MG/L	0.001	U
SW8260D	N	1,2,4-Trichlorobenzene	MG/L	0.001	U
SW8260D	N	1,2-Dibromoethane	MG/L	0.001	U
SW8260D	N	1,2-Dichlorobenzene	MG/L	0.001	U
SW8260D	N	1,2-Dichloroethane	MG/L	0.001	U
SW8260D	N	1,2-Dichloropropane	MG/L	0.001	U
SW8260D	N	1,3-Dichlorobenzene	MG/L	0.001	U
SW8260D	N	1,3-Dichloropropene (total)	MG/L	0.002	U
SW8260D	N	1,4-Dichlorobenzene	MG/L	0.001	U
SW8260D	N	2-Butanone	MG/L	0.005	U
SW8260D	N	4-Methyl-2-pentanone	MG/L	0.005	U
SW8260D	N	Acetone	MG/L	0.005	U
SW8260D	N	Benzene	MG/L	0.001	U
SW8260D	N	Bromodichloromethane	MG/L	0.001	U
SW8260D	N	Bromoform	MG/L	0.001	U
SW8260D	N	Bromomethane	MG/L	0.001	U
SW8260D	N	Carbon tetrachloride	MG/L	0.001	U
SW8260D	N	Chlorobenzene	MG/L	0.001	U
SW8260D	N	Chloroform	MG/L	0.001	U

Prepared by: WCG 6/18/21
Checked by JAR 6/21/21

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

MAY 2021 - VOCs

			Sample Delivery Group	545280	
			Location	SW-5	
			Sample Date	5/20/2021	
			Sample ID	SW-5	
			Qc Code	FS	
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier
SW8260D	N	cis-1,2-Dichloroethene	MG/L	0.001	U
SW8260D	N	Dibromochloromethane	MG/L	0.001	U
SW8260D	N	Ethylbenzene	MG/L	0.001	U
SW8260D	N	Methyl Tertbutyl Ether	MG/L	0.001	U
SW8260D	N	Methylene chloride	MG/L	0.005	U
SW8260D	N	Naphthalene	MG/L	0.001	U
SW8260D	N	Styrene	MG/L	0.001	U
SW8260D	N	Tetrachloroethene	MG/L	0.001	U
SW8260D	N	Toluene	MG/L	0.001	U
SW8260D	N	trans-1,2-Dichloroethene	MG/L	0.001	U
SW8260D	N	Trichloroethene	MG/L	0.001	U
SW8260D	N	Vinyl chloride	MG/L	0.001	U
SW8260D	N	Xylenes, Total	MG/L	0.003	U

NOTES:
VOCs = volatile organic compounds
N = total
mg/L = milligram per liter
U = not detected at the reported quanitation limit
FS = field sample, TB = trip blank

Prepared by: WCG 6/18/21
Checked by JAR 6/21/21

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

MAY 2021 - 1,4-DIOXANE

			Sample Delivery Group	545280		545280		545280		545280	
			Location	SP-1		SW-1		SW-4		SW-5	
			Sample Date	5/20/2021		5/20/2021		5/20/2021		5/20/2021	
			Sample ID	SP-1		SW-1		SW-4		SW-5	
			Qc Code	FS		FS		FS		FS	
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW8270E-SIM	N	1,4-Dioxane	UG/L	0.4	U	0.4	U	0.4	U	0.4	U

NOTES:
ug/l = microgram per liter
N = total
U = not detected at the reported quanitation limit
FS = field sample, TB = trip blank

Prepared by: WCG 6/18/21
Checked by JAR 6/21/21

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

MAY 2021 - INORGANICS

		Sample Delivery Group		545280		545280		545280		545280	
		Location		CFW-1		CFW-5		CFW-5		CFW-6	
		Sample Date		5/20/2021		5/19/2021		5/19/2021		5/19/2021	
		Sample ID		CFW-1		CFW-5		CFW-5 DUP		CFW-6	
		Qc Code		FS		FS		FD		FS	
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW7470A	D	Mercury	MG/L								
SW6020	D	Arsenic	MG/L								
SW6020	D	Barium	MG/L								
SW6020	D	Cadmium	MG/L								
SW6020	D	Chromium	MG/L								
SW6020	D	Lead	MG/L								
SW6020	D	Selenium	MG/L								
SW6020	D	Silver	MG/L								
E410.4	N	Chemical Oxygen Demand	MG/L	20	U	41.6		45.8		29.1	
SM2320B	N	Total Alkalinity, as CaCO3	MG/L	5.74		115		119		31.1	
SW6020	T	Calcium	MG/L	1.58		27.2		28.4		10.2	
SW6020	T	Iron	MG/L	7.37		33.9		35.4		3.41	
SW6020	T	Manganese	MG/L	0.203		2.66		2.72		1.74	

NOTES:
mg/L = milligram per liter
U = not detected at the reported quanitation limit
J = estimated value
FS = field sample, FD = field duplicate
T, N = total, D = dissolved

Prepared by: WCG 6/18/21
Checked by JAR 6/21/21

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

MAY 2021 - INORGANICS

			Sample Delivery Group	545280		545280		545280		545280	
			Location	SP-1		SW-1		SW-4		SW-5	
			Sample Date	5/20/2021		5/20/2021		5/20/2021		5/20/2021	
			Sample ID	SP-1		SW-1		SW-4		SW-5	
			Qc Code	FS		FS		FS		FS	
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW7470A	D	Mercury	MG/L	0.0002	U	0.0002	U	0.0002	U	0.0002	UJ
SW6020	D	Arsenic	MG/L	0.005	U	0.005	U	0.005	U	0.005	U
SW6020	D	Barium	MG/L	0.0222		0.00956		0.0132		0.0126	
SW6020	D	Cadmium	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
SW6020	D	Chromium	MG/L	0.01	U	0.01	U	0.01	U	0.01	U
SW6020	D	Lead	MG/L	0.002	U	0.002	U	0.002	U	0.002	U
SW6020	D	Selenium	MG/L	0.005	U	0.005	U	0.005	U	0.005	U
SW6020	D	Silver	MG/L	0.001	U	0.001	U	0.001	U	0.001	U
E410.4	N	Chemical Oxygen Demand	MG/L			17.2	J	12.2	J	12.2	J
SM2320B	N	Total Alkalinity, as CaCO3	MG/L			6.53		8.51		9.31	
SW6020	T	Calcium	MG/L			2.21		2.94		3.56	
SW6020	T	Iron	MG/L			0.104		12.5		30.7	
SW6020	T	Manganese	MG/L			0.0132		0.25		0.338	

NOTES:
mg/L = milligram per liter
U = not detected at the reported quanitation limit
J = estimated value
FS = field sample, FD = field duplicate
T, N = total, D = dissolved

Prepared by: WCG 6/18/21
Checked by JAR 6/21/21

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

MAY 2021 - RADIOLOGICAL PARAMETERS

		Sample Delivery Group		545280			545280			545280		
		Location		MW-105B			MW-107C			SP-1		
		Sample Date		5/19/2021			5/19/2021			5/20/2021		
		Sample ID		MW-105B			MW-107C			SP-1		
		Qc Code		FS			FS			FS		
Analysis	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Uncertainty	Result	Qualifier	Uncertainty	Result	Qualifier	Uncertainty
E901.1	N	Antimony-125	PCI/L							30	U	3.11
E901.1	N	Cesium-134	PCI/L							10	U	1.23
E901.1	N	Cesium-137	PCI/L							20	U	1.58
E901.1	N	Cobalt-60	PCI/L							10	U	1.47
E901.1	N	Europium-152	PCI/L							20	U	3.76
E901.1	N	Europium-154	PCI/L							30	U	3.6
E901.1	N	Europium-155	PCI/L							60	U	5.38
E901.1	N	Niobium-94	PCI/L							50	U	1.28
E901.1	N	Silver-108	PCI/L							15	U	1.11
E905.0	N	Strontium-90	PCI/L							2	U	0.475
E906.0	N	Tritium	PCI/L	1,020		385	2,630		658	700	U	256

NOTES:
pCi/L = picocurie per liter
U = not detected at the reported quanitation limit
FS = field sample

Prepared by: WCG 6/18/21
Checked by JAR 6/21/21

TABLE 3 - SUMMARY OF VALIDATION ACTIONS
DATA VALIDATION SUMMARY
YANKEE NUCLEAR POWER STATION
ROWE, MASSACHUSETTS

MAY 2021

SDG	Method	Lab Sample ID	Field Sample ID	Fraction	Parameter Name	Lab Result	Lab Qualifier	Final Result	Final Qualifier	Val Reason Code	Units
545280	SW7470A	545280007	SP-1	D	Mercury	0.000161	J	0.0002	U	BL1	MG/L
545280	SW7470A	545280008	SW-1	D	Mercury	0.000157	J	0.0002	U	BL1	MG/L
545280	SW7470A	545280009	SW-4	D	Mercury	0.000152	J	0.0002	U	BL1	MG/L
545280	SW7470A	545280014	SW-5	D	Mercury	0.0002	U	0.0002	UJ	HT	MG/L

Notes:
BL1 = method blank contamination
HT = preparation and/or analysis holding time exceeded
J = estimated value
J+ = estimated value biased high
mg/L = milligram per liter
T, N = total, D = dissolved
U = not detected at the reported quanitation limit

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Volatile Organic Compounds (VOCs)

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
SP-1	6/3/21	FS	Yes	O.K.	Yes	See attached checklist
SW-1	6/3/21	FS	Yes	O.K.	Yes	See attached checklist
SW-4	6/3/21	FS	Yes	O.K.	Yes	See attached checklist
SW-5	6/3/21	FS	Yes	O.K.	Yes	See attached checklist
TB-009	6/3/21	BL (Trip)	Yes	O.K.	Yes	See attached checklist
Laboratory QC						
QC1204836269	6/3/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204836270	6/4/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204836267	6/3/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204836268	6/4/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204836171	6/5/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204836272	6/5/21	SK	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

III. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

See attached checklist for details; no sample qualifications required.

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

Reviewer__Julie Rinaldi Date__June 21, 2021

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Semivolatile Organic Compounds (1,4-Dioxane)

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
SP-1	5/26/21	FS	Yes	O.K.	Yes	See attached checklist
SW-1	5/26/21	FS	Yes	O.K.	Yes	See attached checklist
SW-4	5/26/21	FS	Yes	O.K.	Yes	See attached checklist
SW-5	5/26/21	FS	Yes	O.K.	Yes	See attached checklist
Laboratory QC						
QC1204828220	5/26/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204828221	5/26/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204828222	5/26/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204828223	5/26/21	SK	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

III. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

See attached checklist for details; no sample qualifications required.

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

Reviewer__Julie Rinaldi Date__June 21, 2021

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Total Metals

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
SW-1	6/23/21	FS	Yes	See II. below	Yes	See attached checklist
SW-4	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
SW-5	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-1	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-5	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-5 DUP	6/4/21	DU	Yes	O.K.	Yes	See attached checklist
CFW-6	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
Laboratory QC						
QC1204831651	6/4/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204831652	6/4/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204831653	6/4/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204831654	6/4/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204848868	6/23/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204848869	6/23/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204848870	6/23/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204848871	6/23/21	SK	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

Sample SW-1 initially analyzed using the Filtered Metals container; correct container used for reanalysis completed on 6/23/21.

III. Resolution of Sample Processing/Missing Analytes comments:

See II. Above.

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

See attached checklist for details; no sample qualifications required.

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

Reviewer__Julie Rinaldi Date__June 28, 2021

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Dissolved Metals

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
SP-1	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
SW-1	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
SW-4	6/23/21	FS	Yes	See II. below	Yes	See attached checklist
SW-5	6/24/21	FS	Yes	See II. below	Yes	See attached checklist
CFW-1	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-5	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-5 DUP	6/4/21	DU	Yes	O.K.	Yes	See attached checklist
CFW-6	6/4/21	FS	Yes	O.K.	Yes	See attached checklist
Laboratory QC						
QC1204831651	6/4/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204831652	6/4/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204831653	6/4/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204831654	6/4/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204848868	6/23/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204848869	6/23/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204848870	6/23/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204848871	6/23/21	SK	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

SW-4 and SW-5 initially analyzed using total metals container; correct container used for reanalyses performed 6/23-6/24/21

III. Resolution of Sample Processing/Missing Analytes comments:

See II. Above.

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

See attached checklist for details; no sample qualifications required.

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

Reviewer Julie Rinaldi Date June 28, 2021

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Dissolved Mercury

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
SP-1	6/15/21	FS	Yes	O.K.	Yes	See attached checklist
SW-1	6/15/21	FS	Yes	O.K.	Yes	See attached checklist
SW-4	6/15/21	FS	Yes	O.K.	Yes	See attached checklist
SW-5	6/24/21	FS	Yes	See II. below	Yes	See attached checklist
Laboratory QC						
QC1204842288	6/15/21	BL	Yes	See IV. below	Yes	See attached checklist
QC1204842289	6/15/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204842290	6/15/21	DU	Yes	O.K.	Yes	See attached checklist
QC1204842291	6/15/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204849214	6/24/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204849215	6/24/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204849219	6/24/21	DU	Yes	O.K.	Yes	See attached checklist
QC1204849220	6/24/21	SK	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

SW-5 initially analyzed using the Total Metals container; correct container used for

Reanalysis performed 6/24/21

III. Resolution of Sample Processing/Missing Analytes comments:

See II. above

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

See attached checklist for details; sample results qualified non-detect (U) or estimated (J+) based on method blank contamination

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

Reviewer__Julie Rinaldi Date__June 28, 2021

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Alkalinity

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
CFW-1	6/2/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-5	6/2/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-5 DUP	6/2/21	DU (Field)	Yes	O.K.	Yes	See attached checklist
SW-1	6/2/21	FS	Yes	O.K.	Yes	See attached checklist
SW-4	6/2/21	FS	Yes	O.K.	Yes	See attached checklist
SW-5	6/2/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-6	6/2/21	FS	Yes	O.K.	Yes	See attached checklist
Laboratory QC						
QC1204830167	6/2/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204830168	6/2/21	DU	Yes	O.K.	Yes	See attached checklist
QC1204830169	6/2/21	SK	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

III. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

See attached checklist for details; no sample qualifications required.

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

Reviewer__Julie Rinaldi Date__June 21, 2021

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Chemical Oxygen Demand (COD)

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
CFW-1	5/25/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-5	5/25/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-5 DUP	5/25/21	DU (Field)	Yes	O.K.	Yes	See attached checklist
SW-1	6/11/21	FS	Yes	O.K.	Yes	See attached checklist
SW-4	6/11/21	FS	Yes	O.K.	Yes	See attached checklist
SW-5	6/11/21	FS	Yes	O.K.	Yes	See attached checklist
CFW-6	5/25/21	FS	Yes	O.K.	Yes	See attached checklist
Laboratory QC						
QC1204828319	5/25/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204840419	6/11/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204828320	5/25/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204840420	6/11/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204828321	5/25/21	DU	Yes	O.K.	Yes	See attached checklist
QC1204840421	6/11/21	DU	Yes	O.K.	Yes	See attached checklist
QC1204828322	5/25/21	SK	Yes	O.K.	Yes	See attached checklist
QC1204840422	6/11/21	SK	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

III. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

See attached checklist for details; no sample qualifications required.

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

Reviewer__Julie Rinaldi Date__June 21, 2021

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Gamma Spec

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
SP-1	6/1/21	FS	Yes	O.K.	Yes	See attached checklist
Laboratory QC						
QC1204833549	6/1/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204833551	6/2/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204833550	6/2/21	DU	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

III. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

See attached checklist for details; no sample qualifications required.

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

Reviewer__Julie Rinaldi Date__June 21, 2021

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Strontium-90

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
SP-1	6/8/21	FS	Yes	O.K.	Yes	See attached checklist
Laboratory QC						
QC1204832895	6/8/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204832899	6/8/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204832897	6/8/21	DU	Yes	O.K.	Yes	See attached checklist
QC1204832898	6/8/21	SK	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

III. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

See attached checklist for details; no sample qualifications required.

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

Reviewer__Julie Rinaldi Date__June 21, 2021

ATTACHMENT C

ASSESSMENT OF DATA QUALITY

List each analysis individually. Use a separate table for QC. Duplicates, Blanks and Spikes. (Several pages will be required for each batch)

Tritium

Sample ID	Analysis Date	Sample Designator (Note 1)	All Scheduled Analyses Performed?	Sample Processing Comments?	Units Correct?	Assessment Criteria (Note 2) (Note 3)
MW-105B	6/14/21	FS	Yes	O.K.	Yes	See attached checklist
MW-107C	6/14/21	FS	Yes	O.K.	Yes	See attached checklist
SP-1	6/14/21	FS	Yes	O.K.	Yes	See attached checklist
Laboratory QC						
QC1204840927	6/14/21	BL	Yes	O.K.	Yes	See attached checklist
QC1204840930	6/14/21	QC	Yes	O.K.	Yes	See attached checklist
QC1204840928	6/14/21	DU	Yes	O.K.	Yes	See attached checklist
QC1204840929	6/14/21	SK	Yes	O.K.	Yes	See attached checklist

NOTE

1.0 FS = Field Sample, BL = Blank, QC = Lab Quality Control. DU = Duplicate, SK = Spike

2.0 Reported MDC ≤ Required MDC for FS, DU, BL. Yield for all samples evaluated when reported.

3.0 Requirements for SK, DU, and QC per section D.

I. All Requested analyses performed on all samples? ____X___Yes _____No

II. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

III. Resolution of Sample Processing/Missing Analytes comments:

No processing issues or missing analytes.

IV. Resolution of Anomalies in QC, Duplicates, Spikes, or Blanks (Identified above):

See attached checklist for details; no sample qualifications required.

V. Data verification calculation sheets are attached(at least one calculation per batch) NA

Reviewer__Julie Rinaldi Date__June 21, 2021

ATTACHMENT D
REVIEW OF CHAIN OF CUSTODY AND SAMPLE DOCUMENTATION (SAMPLE)

Sampling Event Date(s) 5/19/21 – 5/20/21 Shipment Date 5/20/21

Wells Sampled in this Batch:

CFW-1	CFW-6	SP-1	SW-5
CFW-5	MW-105B	SW-1	TB-009
CFW-5 DUP	MW-107C	SW-4	

I. All samples identified on COC forms? **X** Yes No

II. Samples obtained match those required by sampling plan? **X** Yes No

III. Verification of unbroken chain of custody for samples? **X** Yes No

IV. Samples received intact by laboratory? **X** Yes No

V. Sample flush volumes and flow parameters consistent with historical data and acceptable? **X** Yes No

VI. Sample non-radiological parameters consistent with historical data and acceptable? **X** Yes No

VII. All preservative and container requirements met? **X** Yes No

VIII. Samples obtained match those required by sampling plan? **X** Yes No

IX. Evaluation for accepting sample for any questions I – VIII answered "NO" (indicate if resample will be done prior to shipment):

Charles R Staples

Reviewer _____ Date 6/18/21

ATTACHMENT E
YANKEE NUCLEAR POWER STATION
SITE CHARACTERIZATION QUALITY ASSURANCE PROGRAM PLAN FOR
SAMPLE DATA QUALITY (SAMPLE)

Identify analytes individually.

Sample	Analyte	Date	Reject, Resample or Reanalyze	Brief Description

NO SAMPLE RESULTS WERE REJECTED FOR THE MAY 2021 SAMPLING EVENT

I. Identify the specific reason for rejection of sample result, resample or reanalysis requirements (this should include a description of why the data point for that analyte man/may not be omitted):

NA

IL Are other analytes from this sample affected? Explain.

NA

III. Are changes to the procedures for sampling, preservation, transport, analysis or assessment required? Explain specific changes.

NA

Reviwer: Date: June 28, 2021

Julie Rinaldi

Yankee Rowe May 2021 SDG 545280 Chemist Review	**Fraction**	D	D	N	N	N	N	N
	Method	SW6020	SW7470A	E410.4	E901.1	E905.0	E906.0	SM2320B
QC Parameter	**Analytical Parameter**	ICP Metals	Mercury	COD	Gamma Spec	Strontium	Tritium	Alkalinity
Case Narrative and Data Package Completeness		X	X	X	X	X	X	X
Holding Time and Sample Preservation/Collection		X	-1	X	X	X	X	X
QC Blanks		X	-2	X	X	X	X	X
Laboratory Control Samples		X	X	X	X	X	X	X
Field Duplicate Precision		NA	NA	X	NA	NA	NA	X
Laboratory Duplicate Precision		NA	NA	X (3)	X	X	X	(4)
Matrix Spike Results		NA	NA	X (3)	NA	X	X	(4)
Surrogate Recovery		NA	NA	NA	NA	NA	NA	NA
Tracer Recovery		NA	NA	NA	NA	X	NA	NA

(1) SW-5 mercury prepped and analyzed after expiration of HT

(2) Mercury method blank = 0.000187 J mg/L; SP-1, SW-1, SW-4 <RL qualified U at RL

(3) COD MS and lab dup performed on SW-1, not COC-specified CFW-5

(4) Alkalinity MS and lab dup performed on non-client sample, not COC-specified CFW-5

(5) Metals MS/MSD performed on CFW-6, not COC-specified CFW-5

NOTE: Lab incorrectly analyzed a subset of metals as dissolved when they should have been total; and analyzed a subset of metals as total that should have been dissolved; reanalyses completed 6/23-6/24/21 and report reissued.

Yankee Rowe May 2021 SDG 545280 Chemist Review	**Fraction**	N	N	T
	Method	SW8260D	SW8270E SIM	SW6020
QC Parameter	**Analytical Parameter**	VOCs	1,4-Dioxane	Ca, Fe, Mn
Case Narrative and Data Package Completeness		X	X	X
Holding Time and Sample Preservation/Collection		X	X	X
QC Blanks		X	X	X
Laboratory Control Samples		X	X	X
Field Duplicate Precision		NA	NA	X
Laboratory Duplicate Precision		NA	NA	NA
Matrix Spike Results		NA	NA	X (5)
Surrogate Recovery		X	X	NA
Tracer Recovery		NA	NA	NA

(1) SW-5 mercury prepped and analyzed after expiration of HT

(2) Mercury method blank = 0.000187 J mg/L; SP-1, SW-1, SW-4 <RL qualifi

(3) COD MS and lab dup performed on SW-1, not COC-specified CFW-5

(4) Alkalinity MS and lab dup performed on non-client sample, not COC-spe

(5) Metals MS/MSD performed on CFW-6, not COC-specified CFW-5

NOTE: Lab incorrectly analyzed a subset of metals as dissolved when they s
been total; and analyzed a subset of metals as total that should have been
reanalyses completed 6/23-6/24/21 and report reissued.

Yankee Rowe May 2021 SDG 545280 Chemist Review	**Fraction**	D	D	N	N	N	N	N
	Method	SW6020	SW7470A	E410.4	E901.1	E905.0	E906.0	SM2320B
QC Parameter	**Analytical Parameter**	ICP Metals	Mercury	COD	Gamma Spec	Strontium	Tritium	Alkalinity
Case Narrative and Data Package Completeness		X	X	X	X	X	X	X
Holding Time and Sample Preservation/Collection		X	X	X	X	X	X	X
QC Blanks		X	(1)	X	X	X	X	X
Laboratory Control Samples		X	X	X	X	X	X	X
Field Duplicate Precision		NA	NA	X	NA	NA	NA	X
Laboratory Duplicate Precision		NA	NA	X (2)	X	X	X	(3)
Matrix Spike Results		NA	NA	X (2)	NA	X	X	(3)
Surrogate Recovery		NA	NA	NA	NA	NA	NA	NA
Tracer Recovery		NA	NA	NA	NA	X	NA	NA

(1) Mercury method blank = 0.000187 J mg/L; sample results <RL qualified U at RL; sample results > RL but <2X blank value qualified J+
(2) COD MS and lab dup performed on SW-1, not COC-specified CFW-5
(3) Alkalinity MS and lab dup performed on non-client sample, not COC-specified CFW-5
(4) Metals MS/MSD performed on CFW-6, not COC-specified CFW-5

Yankee Rowe May 2021 SDG 545280 Chemist Review	**Fraction**	N	N	T
	Method	SW8260D	SW8270E SIM	SW6020
QC Parameter	**Analytical Parameter**	VOCs	1,4-Dioxane	Ca, Fe, Mn
Case Narrative and Data Package Completeness		X	X	X
Holding Time and Sample Preservation/Collection		X	X	X
QC Blanks		X	X	X
Laboratory Control Samples		X	X	X
Field Duplicate Precision		NA	NA	X
Laboratory Duplicate Precision		NA	NA	NA
Matrix Spike Results		NA	NA	X (4)
Surrogate Recovery		X	X	NA
Tracer Recovery		NA	NA	NA

(1) Mercury method blank = 0.000187 J mg/L; sample results <RL qualified
(2) COD MS and lab dup performed on SW-1, not COC-specified CFW-5
(3) Alkalinity MS and lab dup performed on non-client sample, not COC-spe
(4) Metals MS/MSD performed on CFW-6, not COC-specified CFW-5

QC Summary

Workorder: 545280

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS										
Batch 2132799										
Calcium		10200		1950	ug/L	4.37		(0%-20%)	BAJ	06/04/21 05:15
Chromium	U	ND	U	ND	ug/L	N/A		(0%-20%)		06/04/21 11:56
Iron		3410		660	ug/L	3.41		(0%-20%)		06/04/21 05:15
Lead	U	ND	U	ND	ug/L	N/A		(0%-20%)		
Manganese		86.9		16.3	ug/L	6.28		(0%-20%)		06/04/21 12:03
Selenium	U	ND	U	ND	ug/L	N/A		(0%-20%)		06/04/21 05:15
Silver	U	ND	U	ND	ug/L	N/A		(0%-20%)		
Metals Analysis-Mercury										
Batch 2138689										
QC1204842290 545241007 DUP										
Mercury	J	0.000169	J	0.000157	mg/L	7.36 ^		(+/-0.000200)	MTM1	06/15/21 11:20
QC1204842289 LCS										
Mercury	0.00200			0.00206	mg/L		103	(80%-120%)		06/15/21 11:10
QC1204842288 MB										
Mercury			J	0.000187	mg/L					06/15/21 11:08
QC1204842291 545241007 MS										
Mercury	0.00200	J	0.000169	0.00200	mg/L		91.7	(75%-125%)		06/15/21 11:25
QC1204842292 545241007 SDILT										
Mercury	J	0.169	J	0.106	ug/L	214		(0%-10%)		06/15/21 11:27

U samples < RL; J+ > RL and < 10x blank concentration

JAR 6/21/21

Page: 2 of 2
Project # 361620611 7.002
GEL Quote #:
COC Number (1):
PO Number:

GEL Laboratories LLC
gel.com
Chemistry | Radiochemistry | Radiobioassay | Specialty Analytics
Chain of Custody and Analytical Request

GEL Work Order Number: *GEL Project Manager:*

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

545280

Client Name: WOOD E+IS Phone # 207-775-5401
Project/Site Name: YANKEE ROWE, MA. Fax #
Address: 511 CONGRESS ST. PORTLAND, ME, 04101
Collected By: RA, DL, JM Send Results To: GENE SHEPHARD

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive (If yes, please supply isotopic info.)	Should this sample be considered: (7) Known or possible Hazards	Total number of containers	VOC, 8260 w/TICs	1-4 Dioxane 8270 SIM	C.A, Fe, Mn	RCRA 8 Metals 6020/7470	Alkalinity	C.O.D.	Gamma Spec	Strontium 90 GPC, LSC	Tritium (LSC) Hard to Detect		<-- Preservative Type (6)
CFW-1	5/20/21	0950	N	N	GW	N	N	3			X		X	X					
SP-1	5/20/21	0825	N	Y	SW	N	N	9	X	X		X			X	X	X		
SW-1	5/20/21	1010	N	Y	SW	N	N	9	X	X	X	X	X	X					
SW-4	5/20/21	1035	N	Y	SW	N	N	9	X	X	X	X	X	X					
SW-5	5/20/21	1100	N	Y	SW	N	N	9	X	X	X	X	X	X					
TB-009	5/20/21	0810	TB	N	W	N	N	3	X										

Comments
Note: extra sample is required for sample specific QC

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
René Ambé	5/20/21	1600	1	5/21-21	0930
2			2		
3			3		

TAT Requested: Normal: X Rush: ____ Specify: ____ (Subject to Surchage)
Fax Results: [ ] Yes [X] No
Select Deliverable: [ ] C of A [ ] QC Summary [ ] level 1 [ ] Level 2 [ ] Level 3 [ ] Level 4
Additional Remarks: DELIVERABLE: SEE QUOTE
For Lab Receiving Use Only: *Custody Seal Intact?* [ ] Yes [ ] No ***Cooler Temp:*** ____ °C
> For sample shipping and delivery details, see Sample Receipt & Review form (SRR.) *Sample Collection Time Zone:* [X] Eastern [ ] Pacific [ ] Central [ ] Mountain [ ] Other:

1.) Chain of Custody Number = Client Determined

2.) QC Codes: **N** = Normal Sample, **TB** = Trip Blank, **FD** = Field Duplicate, **EB** = Equipment Blank, **MS** = Matrix Spike Sample, **MSD** = Matrix Spike Duplicate Sample, **G** = Grab, **C** = Composite

3.) Field Filtered: For liquid matrices, indicate with a - **Y** - for yes the sample was field filtered or - **N** - for sample was not field filtered.

4.) Matrix Codes: **DW**=Drinking Water, **GW**=Groundwater, **SW**=Surface Water, **WW**=Waste Water, **W**=Water, **ML**=Miscl. Liquid, **SO**=Soil, **SD**=Sediment, **SL**=Sludge, **SS**=Solid Waste, **O**=Oil, **F**=Filter, **P**=Wipe, **U**=Urine, **F**=Fecal, **N**=Nasal

5.) Sample Analysis Requested: Analytical method requested (i.e. **8260B, 6010B/7470A**) and number of containers provided for each (i.e. *8260B* - **3**, *6010B/7470A* - **1**).

6.) Preservative Type: **HA** = Hydrochloric Acid, **NI** = Nitric Acid, **SH** = Sodium Hydroxide, **SA** = Sulfuric Acid, **AA** = Ascorbic Acid, **HX** = Hexane, **ST** = Sodium Thiosulfate, If no preservative is added = leave field blank

7.) KNOWN OR POSSIBLE HAZARDS

RCRA Metals
As = Arsenic **Hg**= Mercury
Ba = Barium **Se**= Selenium
Cd = Cadmium **Ag**= Silver
Cr = Chromium **MR**= Misc. RCRA metals
Pb = Lead

Characteristic Hazards
FL = Flammable/Ignitable
CO = Corrosive
RE = Reactive

TSCA Regulated
PCB = Polychlorinated biphenyls

Listed Waste
LW= Listed Waste
(F, K, P and U listed wastes.)
Waste code(s):

Other
OT= Other / Unknown
(i.e.: High/low pH, asbestos, beryllium, irritants, other misc. health hazards, etc.)
Description:

Please provide any additional details below regarding handling and/or disposal concerns. *(i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.)*

Field personnel confirmed filtered sample included only the RCRA 8 metals sample container; all other analyses were submitted as unfiltered total sample aliquots

SDR 6/21/21